MODEL AIRPLANE NEWS

12th Year of Publication

MAY 1941
20c

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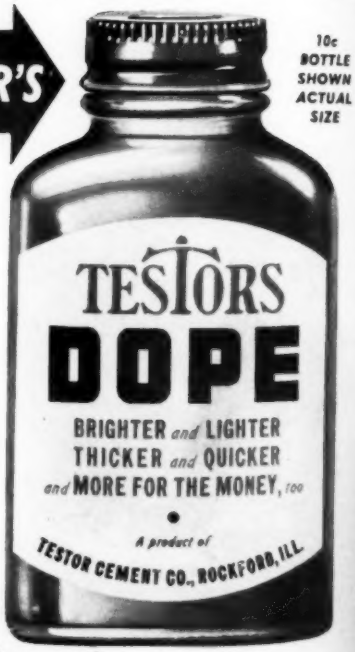

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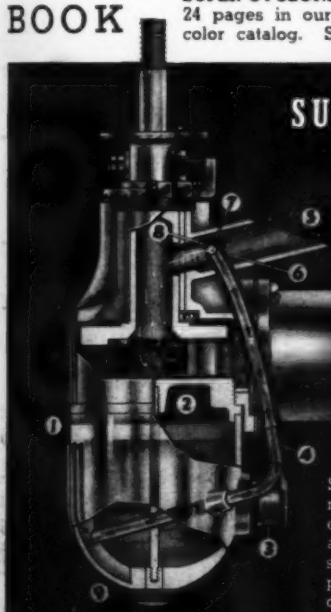

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PROP WASH

ON THE THRESHOLD of manhood American boys in their teens stand inspired and impelled to seek self-expression: Ready to try their wings.

FROM THIS URGE saints or sinners are born; led into one channel or the other by the instrument of expression put into their hands at this vital moment. It is this instrument that exercises body, mind and spirit for creation or destruction.

WHAT WILL BUILD them into strong virile manhood? That is the question. What will inspire them, prompt initiative, cultivate patience and tenacity, build their minds and bodies? Here lies no great mystery. Model planes have sired these virtues in the past and bless the future with promise of greater continued service. They give life to the dreams of our young men, in simple form and with little cost guiding them along the road to unbounded scientific study and research. Lillienthal, Langley, Wright, Douglas and a host of others have used them as stepping stones to success and greater aeronautical knowledge.

IN MINIATURE, MODELS present the problems of the large airplane designer and builder and the challenge of solution to those who would become great. Their delicate structures materialize the secret of the craftsman's deft fingers; the magic touch, which also gives form and life to modern air giants in the service of our country.

ALL OF THESE virtues, together with the blessings of vital physical activity in effort to follow fleeting planes, are the heritage of the Aeromodeler. Yes! If Youth Makes Models, Models Will Make Men.

The Editor

12TH YEAR OF PUBLICATION

MODEL AIRPLANE NEWS

MAY 1941 VOL. XXIV, No. 5

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Edited by
Charles Hampson Grant

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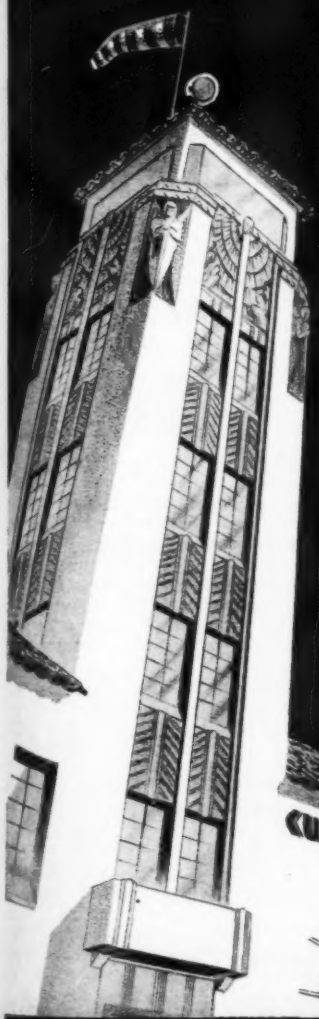
Published monthly by Jay Publishing Corp., Mt. Morris, Illinois. Editorial and advertising offices: 551 Fifth Ave., New York, N.Y. George C. Johnson, President; Jay P. Cleveland, Advertising Manager. Entered as second class matter Dec. 6, 1934 at the post office at Mt. Morris, Ill., under the act of March 3, 1879. Additional entry at New York, N.Y. Price 20c per copy. Subscriptions $2 per year in the United States and possessions; also Canada, Cuba, Mexico, Panama and South America. All other countries $2.50 per year. *Copyright 1941 by Jay Publishing Corp.*

Train
AT AVIATION'S SCHOOL OF THE HOUR!



IN THE VERY CENTER AND A VERY IMPORTANT PART OF SOUTHERN CALIFORNIA'S GREAT AIRCRAFT INDUSTRY IS LOCATED CURTISS-WRIGHT TECHNICAL INSTITUTE

Established in 1929, in twelve years this famous school has come to be recognized as the nation's leading institution in the training of Aeronautical Engineers and Master Mechanics. Mr. Donald Douglas, President of the great Douglas Aircraft Company, chose this school for his own son's training which pointedly indicates the high standing this school has attained in the aircraft industry.

You, who plan to invest in a course of career training to prepare yourself for the future, must determine in advance what the returns will be on your investment before you put cash on the line. This is imperative since your choice of a school in which to take your training will determine how much money you will make all the rest of your life. Your whole future in aviation depends on your training.

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Aviation needs trained men. They are in demand and at a premium. Advancements for them are rapid, especially here in Southern California where there are over a billion dollars in unfilled aircraft orders on hand and where over fifty per cent of all aircraft manufactured in the United States is made. You can get in on the ground floor by training now. BUT you must choose the right school for your training.

Our graduates are obtaining immediate employment and the demand for them far exceeds the supply. We honestly believe that every student who enrolls here will be able to obtain, with our assistance, immediate employment upon graduation. This school has never guaranteed or promised positions for its graduates, but practically every graduate has obtained immediate employment, and is advancing steadily.

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MODEL

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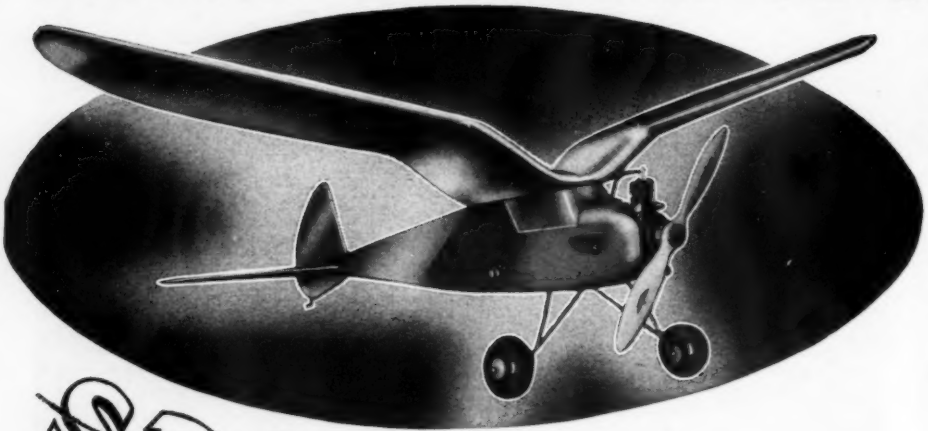
WATCH IT WALK UPSTAIRS



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★

AND WATCH IT COME DOWN IN THE PRETTIEST 3-POINT LANDING YOU EVER SAW

SPOOK GULL WING

ONLY BASICALLY NEW GAS MODEL NOW FLYING

Latest U. S. Navy Martin Patrol Bomber Is a Gull-Wing Airplane

See Cover March Model Airplane News.

A PRIZE LETTER *from one Modelcraft* **PRIZE WINNER**

Dear Sirs:

I have a Miss Tiny with 199 flights on it. It looks and flies as good as the day it was finished. I also have a Sky Baby with over 200 flights, and have won contests with both of these planes. I have recently bought two Spook 48's. The first did 2 min. 15 secs. on the first flight, the other 1 min. 45 secs. These planes were powered by an Ohlsson 23 and Ohlsson 19. I have a Spook 72 almost finished. Will send you a picture of the fleet. After flying Miss Tiny in the Farmville, Va., contest, all the boys in the Farmville club have since bought Miss Tiny kits. I took all the prizes.

Casey Casebier.

R. F. D. 1, Lynchburg, Va.

SPOOK 72. Weighing only 3 lbs. yet with the strength factor of a 5 lb. airplane, Spook 72 was built for modelers who want to get into Class C and be sure of having an airplane left after their first two or three flights.

Requires absolutely no knowledge of model aeronautics—no mechanical ability—no skill at handling a jittery eagle—to fly! For all their speed the Spooks are the nearest thing to FOOLPROOF contest models so far designed.

A BEGINNER CAN WIN WITH THIS SHIP. *Contest performance* is what you're buying, plus the one basically new gas model now flying.

SPECIFICATIONS—Wingspan 72"; Overall length 49¼"; Wing Area 6 sq. ft. Total Wt. with motor, 48 oz.; Wing Loading 8 oz. per sq. ft. Airfoil RAF 32—Clark Y. Power with any Class C engine.

Plans Only **50c** **$3.95**

★ ★

SPOOK 48. Ten seconds after you release the little Spook the sun will be in your eyes and your heart kicking against your ribs. This little kite doesn't merely climb, it tears.

With a Spook 48 you have the absolute confidence that you have the fastest Class A or B ship on the field—and the model that is introducing a new ACCEPTED principle of aeronautical design. What a sweetheart of a glide! Those thermals just crawl underneath the gull wings and park there.

Wing is easily removable to get to battery, and is so mounted as to fly off in case of a rough landing. The test model was undamaged in any way after well over 100 flights.

SPECIFICATIONS—Wingspan 48"; Overall Length 32"; Wing Area 2⅓ sq. ft. Total wt. with motor 18 oz.; Wing Loading 8 oz. per sq. ft. Airfoil RAF 32-CLARK Y. Power with any Class A or B engine.

Plans ONLY **25c** **$1.50**

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ALL MODERN

Modelcraft's new rubber power job. Flying qualities are truly natural, requiring the very minimum of adjustment. Polyhedral wing, dihedral stabilizer with twin rudders, one bladed folding prop, 45 ft. best durable rubber, beautiful clearly printed sheet, and ample supply of everything. A Wakefield model, crammed with value in parts and design. Test flight covered 7 miles using 100 turns on 3½ to 1 winder.

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SEE MODELCRAFT'S OFFICIAL PROPELLER SPECIFICATION CHART FOR THE CORRECT PROP FOR YOUR MAKE AND AGE OF ENGINE. AT YOUR DEALER'S OR WRITE FOR FREE COPY.

Are you flying a *high-pitched* prop, thinking you're getting better performance from it? The reverse is actually true—although (not liking to disagree with customers) we had about given up hope of getting this over.

Then at a testimonial dinner to Carl Goldberg the other night, Carl got up and said: "Now speaking about props, a lot of you fellows are using too high a pitch. Where you would use an 8" pitch, I always use a theoretical 6". And frankly we could have almost kissed him." Fly your present prop and then one of our new D-G props on your present motor and SEE the difference. Consult the Specification Chart or give your make and age of engine when ordering.

25¢

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• NEW HIGH THRUST WITH NEW LOW-PITCHED PROPS

•NOT A CLUB IN A CARLOAD (to break your crankshaft)

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MODELCRAFT MOSQUITO FLEET *and* HOW *they Buzz!*

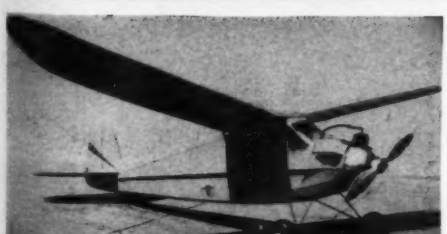
RECORD WRECKER
One did 46 and 54 min. in 2 consec. flights. 26" wing span. Kit contains free wheeling unit, dope, rubber, and clear plans.

PACIFIC ACE
Over 325,000 sold. Ample quantity of first grade balsa and high quality cement. Outflies many dollar kits. 30" wing span.

BLACK BULLET
A low wing job that flies as good or better than high wings. Anyone can fly it. 30" wing span. Kit fully complete.

THE CHAMP
All that the name suggests. One of the fastest rubber jobs ever built. Wing area 191 sq. in. An outstanding value.

TWO CONTEST-WINNING AVIATOR'S MODELS



MISS TINY. Flight tested, with two years of successful contest performance, Miss Tiny keeps on taking firsts against both Class A and B contestants. We have yet to hear of an owner who isn't crazy about Tiny. Don't choose her if you are looking SOLELY for contest flying (get a Spook 48), but if you want a model that is built along standard airplane lines, you won't be disappointed in Tiny either in appearance or performance. Wing span 46".
DE LUXE..... **$3.95**
Also, Standard, $2.95. Dry, $1.95. Plans ONLY..... 25c

SKY BABY Class B. No matter how much we neglect Sky Baby for Spooks, War Planes, Props, and other things, she keeps on selling. This is undoubtedly because thousands of you have Class B motors and are looking for something that looks like an airplane and not like a "walking stick." Sky Baby has very fast climb due to completely new wing section and will operate with *any* Class B engine. Air wheels, aluminum cowl, full equipment as shown in photograph. Wing span 54".
DE LUXE..... **$3.85**
Plans ONLY..... 50c

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These accurate replicas of today's most outstanding fighting ships have been designed from original photographs and other authentic material. Every one a flyer. Nothing missing for complete model.

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CURTISS P-40—Army pursuit fighter—25" wg. spd.
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By AL LEWIS

AVIATION PAGES

Where Does the Model Airplane Builder Stand in the Aircraft Industry?

Typical model airplane builder who made good in aviation industry is Edmund S. Whitten Jr., now with Vought-Sikorsky Aircraft at Bridgeport, Conn.

YOU must have heard a lot of folks exclaim over your patience, your skill and your ingenuity as a model airplane builder.

But, did you ever hear anyone say, "Give me a model airplane builder to do my craftsmanship work, for there's no better training for aviation employment than model plane building!" Well, we did!

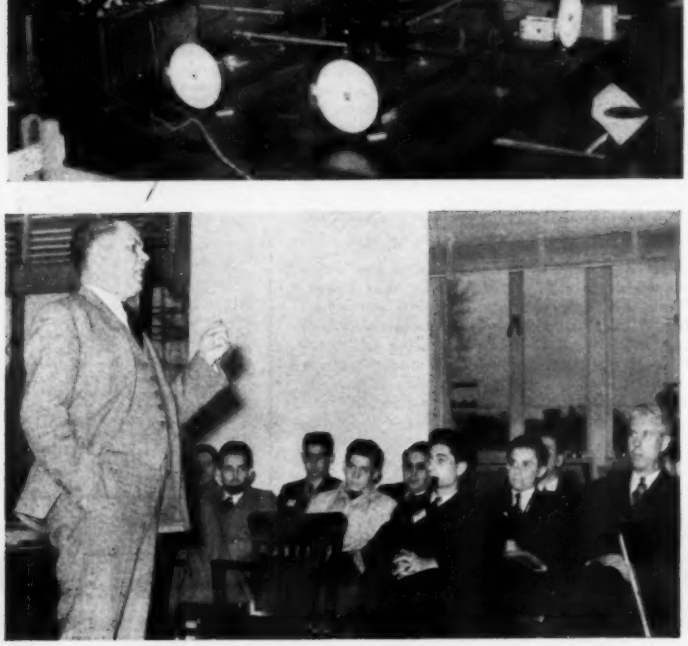
The man who said it, is one of the most important persons in the United States as far as the future of American air supremacy is concerned. He is Edward R. Sharp, Sr. of the National Advisory Committee for Aeronautics, former engineer-in-charge for the government's aero testing labs, and now construction engineer concerned with completing N.A.C.A.'s new Moffett Field base on the West Coast and the engine division at Cleveland.

It is rather a significant thing when a person like Mr. Sharp commits himself to such an extent. Behind that commitment lies a story that illustrates what excellent training model plane designing, building and flying is for a career in the aviation industry.

Some years ago, Mr. Sharp became interested in a model airplane club at Hampton, Va. Known as the Hampton Roads Model Club, the group wasn't large, but it made up in enthusiasm what it lacked in numbers. Among the members was a young fellow named Charles A. Hulcher, whom everybody called "Tom" for some unexplained reason. Tom and the gentleman from N.A.C.A., Mr. Sharp, became fast friends, and it was not long before Mr. Sharp became the official sponsor of the aeromodeling organization.

As the tale is told, one day Mr. Sharp thought it would be very nice to give Tom a "try" at the nearby Langley Field N.A.C.A. testing labs. How Tom was smuggled in remains a mystery—the idea of a model airplane builder having anything to do with aviation

(Left) Hewitt Phillips "plays nurse" to complicated gadgets that measure the reactions in the wind tunnel below. (Courtesy Jordan Marsh)



(Lower left) Edward R. Sharp Sr., construction engineer for N.A.C.A., whose confidence in model airplane builders has led to employment of more than 200 such hobbyists at Langley Field, Va. (Kulick Photo)

(Below) When Hewitt Phillips won airplane trips as prizes in major meets he did not foresee how modeling would lead to a position as junior engineer with N.A.C.A., Langley Field. (Lewis Photo)

THE MODEL BUILDER

Rocco Glorioso is an example of skilled model builder becoming leader in activity, with eventual participation in full scale aviation

Bernard O. Beck, leader-modeler at Chanute Field with army air corps still retains interest in models

John Dilly, one of Canada's expert model flyers and machinist, was asked to build a model wind tunnel and instruct youngsters. (Lewis Photo)

engineering or the airplane industry itself never struck anyone—that is, anyone except Mr. Sharp.

Tom Hulcher came through in typical Frank Merriwell style (How could he fail? Wasn't he a model airplane builder?) and so impressed officials at N.A.C.A. ("I told you so," we can hear Mr. Sharp saying) that Civil Service executives were prevailed upon to hold a competitive exam for model airplane builders so a few more could be taken into the ranks of N.A.C.A. as full-time employees.

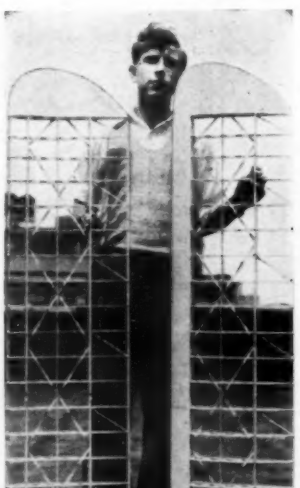
Today the record stands at something like more than 200 enthusiastic modelplane experts working at Langley—and nobody knows how many more will soon be serving their country in the Committee's labs at Cleveland and the Moffett plant at Sunnyvale, Calif.

What happened at N.A.C.A. is just a sample of what is going on throughout the entire aviation industry. We could continue our investigations by starting at the bottom with the names of modelers who have just entered the aviation industry as junior engineers, sheet metal workmen, draftsmen, checkers, inspectors, and go on down the line of positions which have been created since America started warming up her aerial engine of defense.

If you prefer to start at the top of the ladder, we can take a look at some of the model airplane builders who have made good in a big way. We grant you that ability, perseverance and plenty of hard work was also associated with their success, but each one received invaluable background through their model airplane work.

Leaders include Douglas, Martin, Loening, Wright, Bellanca, Sikorsky, Chamberlin, Curtiss, de la Cievra, Burnelli, Stout and many others. Edward P. Warner, of the Civil Aeronautics Board, is an "old-time" modeler; so is Ralph Barnaby of soaring fame. Richard Byrd is another ex-modeler who credits this hobby as one of splendid training.

Not only have model builders shown their capabilities in the aviation industry, but they also excel as pilots and ground operations personnel whose familiarity with aerodynamics and aircraft through their modeling activity has placed them above the general run of such employees.



Joe Kovel in 1935, with wing framework of the KG gas model which gave "wings" to many an enthusiast. He is now employed at Brewster Aircraft Co.

Proof of this is shown by such comment as this by Leo Rutledge, Academy of Model Aeronautics' State Contest Director for Kansas: "Model aeronautics in Wichita and Kansas has enjoyed its share of recognition during the past two years, and many of our model enthusiasts have gained responsible positions in the general expansion program."

"We have had several model flyers leave to join the army," reports L. B. Bush, A.M.A. State Contest Director for Nebraska. "One of them is a draftsman in the tool designing department of Douglas Aircraft Company, and the best model flyer we

(Continued on page 32)

Bernard Whitman was outstanding solid-scale model builder who became one of the head men in the stress-analysis department at Vought-Sikorsky plant

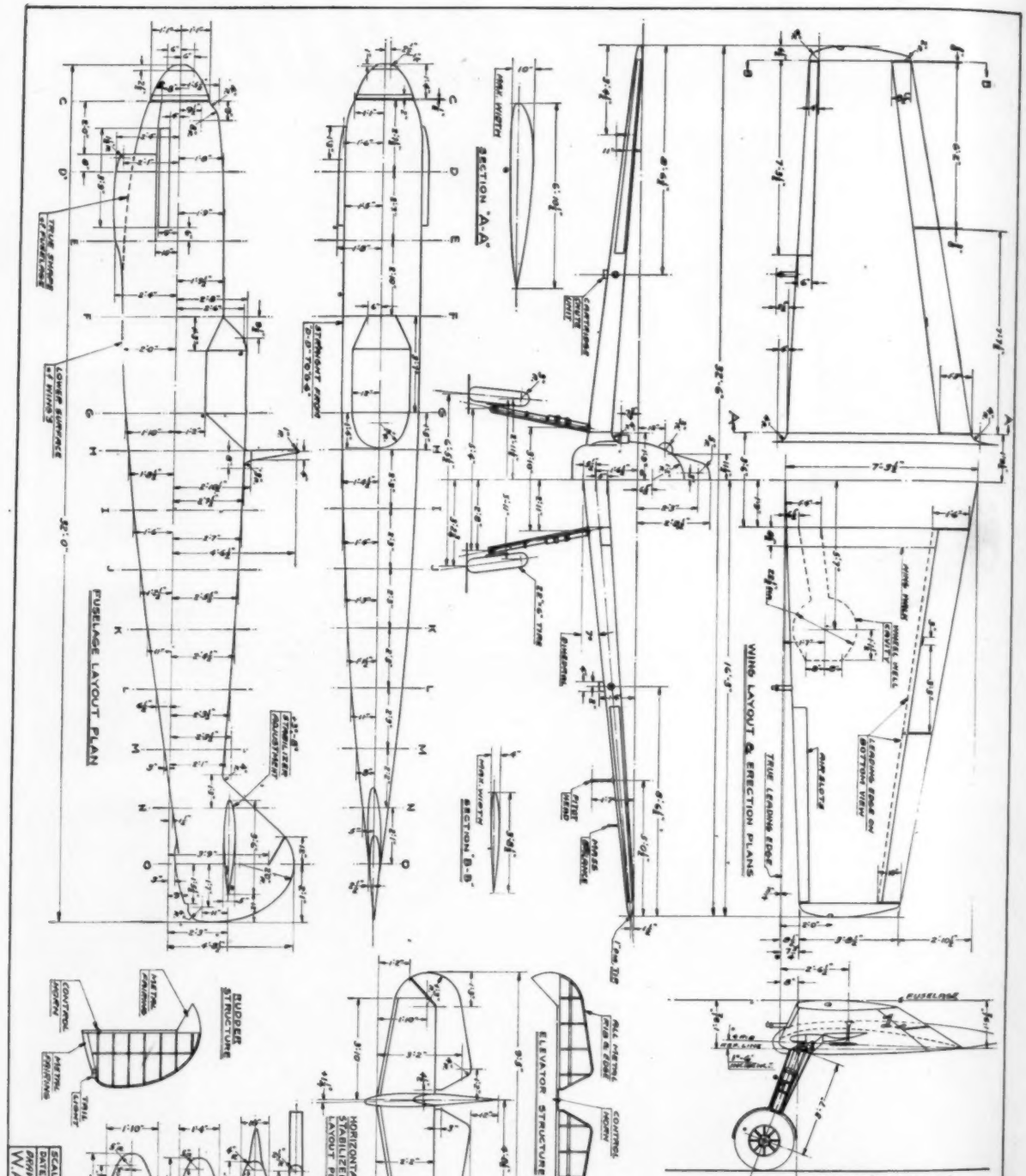
Edward S. Booth, '39 member of Canadian Wakefield team, became editor of "Canadian Aviation," and recently resigned to serve in Canadian Air Corps

Charles A. ("Tom") Hulcher was first model airplane builder hired by N.A.C.A. His success convinced Committee heads that training in model aircraft work makes skilled workmen. (Lewis Photo)

Syd Wallerstein was outstanding Boston model designer and flyer. Syd is now at Savannah (Ga.) Air Base waiting for induction into army air corps

Bob Shea was among first New England boys to seek work in aviation industry on West Coast. His success with Lockheed started a migration

Avrum Zier, model designer and writer, has found profitable employment in aviation; employed by Brewster Aircraft in the engineering department for several years. (Kulick Photo)


FUSELAGE LAYOUT PLAN
WING LAYOUT & ERECTION PLANS
RUDDER STRUCTURE
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ELEVATOR STRUCTURE
FUSELAGE'S CROSS SECTIONS
SECTION "A-A"
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TRUE LEADING EDGE
VERTICAL REF. LINE IS 90° TO ℄ FUSELAGE
LAYOUT PLANS & DETAILS
GERMANY'S MESSERSCHMITT
"Me-109J"
SCALE: 3/4" = 1'-0"
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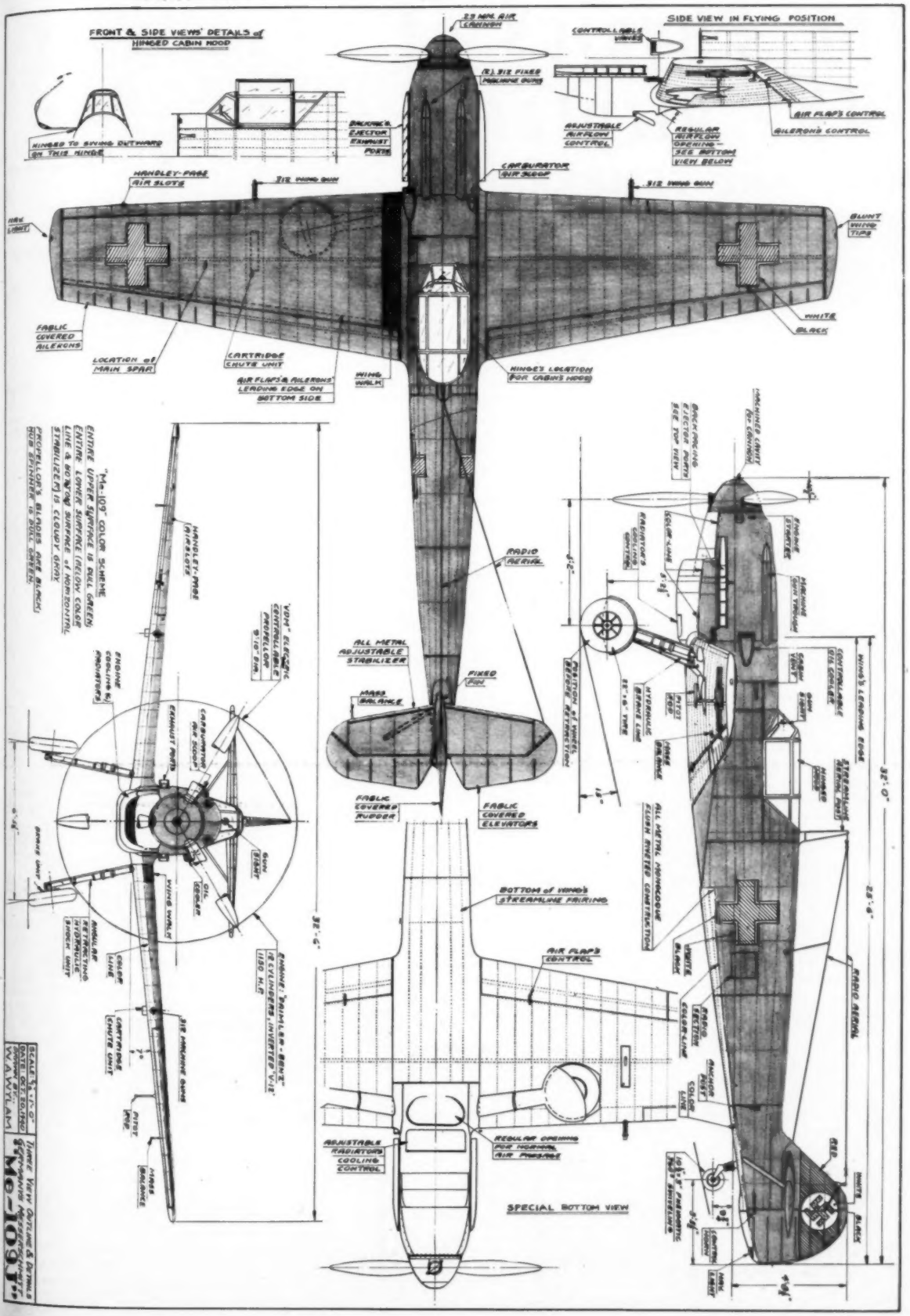
FRONT & SIDE VIEWS' DETAILS of HINGED CABIN HOOD
HINGED TO SWING OUTWARD ON THIS HINGE
SIDE VIEW IN FLYING POSITION
23 MM. AIR CANNON
(2) 7.92 FIXED MACHINE GUNS
CONTROLLABLE LOUVES
AIR FLAPS CONTROL
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REGULAR AIR FLOW OPENING — SEE BOTTOM VIEW BELOW
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AIR FLAPS & AILERONS' LEADING EDGE ON BOTTOM SIDE
WING WALK
HINGE'S LOCATION (FOR CABIN'S HOOD)
"Me-109" COLOR SCHEME
ENTIRE UPPER SURFACE IS DULL GREEN
ENTIRE LOWER SURFACE (ALLOW COLOR LINE & BOMB) SURFACE of HORIZONTAL STABILIZER IS CLOUDY GRAY
PROPELLER'S BLADES ARE BLACK HUB SPINNER IS DULL GREEN
RADIO AERIAL
ALL METAL ADJUSTABLE STABILIZER
FIXED FIN
MASS BALANCE
FABRIC COVERED RUDDER
FABRIC COVERED ELEVATORS
"VDM" ELECTRIC CONTROLLABLE PROPELLER 9'10" DIA.
ENGINE COOLING RADIATORS
EXHAUST PORTS
OIL COOLER
SPARK UNIT
ANGULAR RETRACTING HYDRAULIC SHOCK UNIT
COLOR LINE
ENGINE: "DAIMLER-BENZ" (12 CYLINDERS, INVERTED "V") (1150 H.P.)
32'-6"
BOTTOM of WING'S STREAMLINE FAIRING
AIR FLAPS CONTROL
ADJUSTABLE RADIATORS COOLING CONTROL
REGULAR OPENING FOR NORMAL AIR PASSAGE
SPECIAL BOTTOM VIEW
BACK-PACKING EJECTOR PORTS — SEE TOP VIEW
RADIATOR'S COOLING CONTROL
ENGINE STARTER
HANDLEY-PAGE AIR SLOTS
RADIATION of HEAT BEFORE ATTRACTION
HYDRAULIC BRAKE LINE
PITOT TUBE
FIXED BRAKE
CONTROLLABLE OIL COOLER
WING'S LEADING EDGE
ALL METAL MONOCOQUE FUSELAGE RIVETED CONSTRUCTION
RADIO ANTENNA
ANCHOR POST
COLOR LINE
RADIO EJECTION
"VDM" PROPELLER'S BLADES ADJUSTING
WHITE
BLACK
32'-0"
29'-6"
Me-109T
Three View Outline & Details of German Messerschmitt
SCALE: 3/16"=1'-0"
DATE OF DRAWING
W.A.WILLAM

The Physics of The Airplane

HEAT AND TEMPERATURE

By LT. JAMES P. EAMES and WILLIS L. NYE

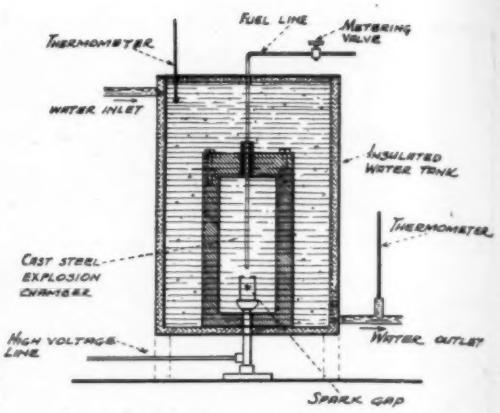


Fig. 1. A laboratory type of calorimeter bomb

HEAT is a form of energy. Its study and measure must be based upon its effects, manifestations and results. Some common substance must be selected and employed as a standard in order to establish a system of arbitrary units so heat energy can be measured. Then, by applying the heat energy so as to raise the temperature of the basic element (substance), an arbitrary unit can be established and applied in general to the measurement of all quantities of heat. The easiest substance to obtain is water (H_2O) and therefore, it is not strange that this was selected as an ideal medium or "yardstick" for the purpose.

The conventional unit employed throughout the various phases of the aeronautical industry for temperature measuring is the British Thermal Unit, abbreviated B.T.U. This unit is defined as the amount of heat required to raise the temperature of 1 pound of water one degree Fahrenheit. As a practical illustration, high test gasoline—aviation fuel—has a heating value of approximately 21,000 B.T.U.s., i.e. (21,000) B.T.U.s of heat energy can be released, subsequently to be converted into useful mechanical work.

Other substances of course will require various amounts of heat to raise the temperatures of their masses one degree Fahrenheit Scale; varying according to chemical composition and physical characteristics. Thus, we can define a quantity known as "specific heat" by stating the ratio of heat required to raise the temperature of an equal mass of water is called the "specific heat" of the substance. We would naturally expect the specific heat of aluminum alloy used for engine cylinder heads to be higher than that of lead used in soldering connections, since more heat energy is required to heat the former. This, of course, is true, the specific heat of aluminum being .22, while that of lead is approximately .03.

Aviation engineers are employed by leading petroleum corporations to carry on endless research leading to improvement of aviation fuels. A routine task of these men is to determine the heating value of aviation gasoline by experiments involving the use of a calorimeter bomb, similar to that illustrated by Figure 1. A known mass of fuel is admitted to a central crucible which, in turn, is immersed in a bath of continuously flowing water. This cooling water enters the calorimeter at a constant temperature determined by the thermometer. The water leaving the calorimeter will, of course, have its temperature raised, this quantity being determined by the thermometer placed just ahead of the water outlet orifice. If this water is weighed, and the quantity of burned gas measured, it becomes possible for the observer to calculate the quantity of heat generated per cubic pound or liter of gas. Aviation gas must be first structure

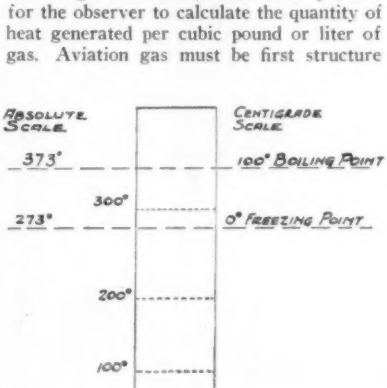


Fig. 3. A comparison of the Absolute and Centigrade scales

gas with a high anti-knock value or octane rating. Octane rating is the quality of withstanding high compression without tendency to show pre-detonation characteristics. For example:

A six gram specimen of aviation gasoline is burned in a calorimeter containing 12 pounds of water, causing a temperature rise from 60 to 82 degrees Fahrenheit. How many B.T.U.s are obtained from each pound of gasoline?

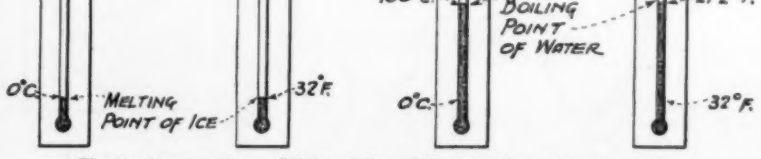


Fig. 2. A comparison of Fahrenheit and Centigrade temperature scales

HEAT VALUE =

$$\frac{\text{Mass of water} \times \text{temperature change}}{\text{Mass of fuel}} = \frac{12 \times (82-60)}{.0132} \text{ or } 20{,}000 \text{ B.T.U.s}$$

Note: 6 grams equals .0132 pounds.

Heat measurement becomes of utmost importance in all phases of aeronautical engineering. Heat treatment of aircraft structural metals, oil temperatures, engine coolants, welding procedure and even examination of the upper atmosphere at critical altitudes, call for accurate and precise temperature measurements. The conventional instrument employed for actual measurement, or to calibrate other heat measuring devices, is the heat thermometer.

The conventional temperature thermometer consists of a small glass bulb sealed to an upright glass tube of very small internal diameter from which the air has been evacuated. Then the bulb and tube is filled with mercury. The stem or outside of the tube is graduated into a scale with equal divisions representing degrees of temperature. The fixed points nominally selected for the mercury thermometer are the melting point of ice for the lower limit, and the boiling point of water under atmospheric pressure for the upper limit. Of the two types in common use, the aeronautical industry recognizes both, i.e., the Fahrenheit scale and the Centigrade scale. The fixed points for these two thermometer types are 32 F. and 0 degrees C; the upper limit is 212 F. and 100 degrees C. See Fig. 2.

From the above relations, we can see that 180 divisions or degrees on the Fahrenheit scale correspond to 100 similar units on the Centigrade scale. Thus, 1 degree on the Fahrenheit scale equals five ninths of 1 degree on the Centigrade scale. Since it frequently becomes necessary for aerotechnicians to convert temperature readings and recordings from one scale to the other, the following formula proves useful:

$$\text{Centigrade Degree} = \frac{5}{9} \times (F^\circ - 32)$$

$$\text{Fahrenheit Degree} = \frac{9}{5} \times (C^\circ \text{ plus } 32)$$

Example:

The inside temperature of an aircraft heat treating oven is 125 degrees Centigrade. This would read on the Fahrenheit scale:

(Continued on page 35)

MODEL DESIGNING SIMPLIFIED

ARTICLE 6

How to Design Your First Fuselage Model—Determining the Size and Proportions for Stability and Efficiency

By CHARLES HAMPSON GRANT

USUALLY the simplest things are the most efficient. Especially is it true in the case of an airplane, for simplicity insures the least amount of structure and weight; the most direct method of obtaining your purpose. Complication increases weight and usually makes a model more difficult to build. Consequently, a beginner's model is not necessarily a poor flier, provided it has been constructed reasonably well. The model we are undertaking to design and build, though essentially for the beginner, is an excellent flier because it is properly proportioned, though the structure is simple.

In creating a model, three basic operations must be undertaken: First, it must be designed; second, the design is laid out on paper, or plans drawn; third, it must be built according to the plans. The novice is usually at a loss to know how to begin such an undertaking; however, it is quite simple if he follows a certain simple procedure. This and succeeding articles will take up this procedure step by step. To create anything one must know the essential factors involved. In an airplane, these are the basis of flight and may be listed as follows:

1) Lift.
2) Propulsion, or a means of moving the aircraft forward.
3) A source of power.
4) Stability.
5) A means to take off and land.
6) Structure of the airplane.

In an airplane number 1 is the wing which generates lift and supports the craft in flight. Number 2 is the propeller that produces the necessary forward motion. Number 3 is the rubber, or gasoline motor that generates power to drive the propeller. Number 4 is an abstract quality depending upon the plane's proportions and auxiliary surfaces which do not contribute necessarily to supporting the airplane in flight but merely functions to give it proper balance and return it to level flight when once disturbed. Number 5 is the landing gear upon which the airplane rests when in contact with the ground. Number 6 is the fuselage, struts, connecting wires, etc., that do not contribute in any manner to the direct functioning of other parts but merely serve to connect and hold them in their correct relative position. Nothing else is required for flight.

The problem in designing a plane is to create structures that will fulfill efficiently the functions of these factors. If the airplane is to be efficient, each part of the structure must be reduced to the simplest form. They must be strong enough to resist all stresses yet be as light as possible.

The success of the airplane will depend upon: (1) the simplicity and lightness of the structure; (2) the quality of craftmanship that the builder displays in creating it. Number 1 is a problem of design and it is the purpose of this article to outline the technique that will enable one to produce an efficient plane. Number 2 is a matter of practice in constructing model planes. The success a builder will attain in the second case can be assured to a practical degree by designing a structure embodying only the simplest operations.

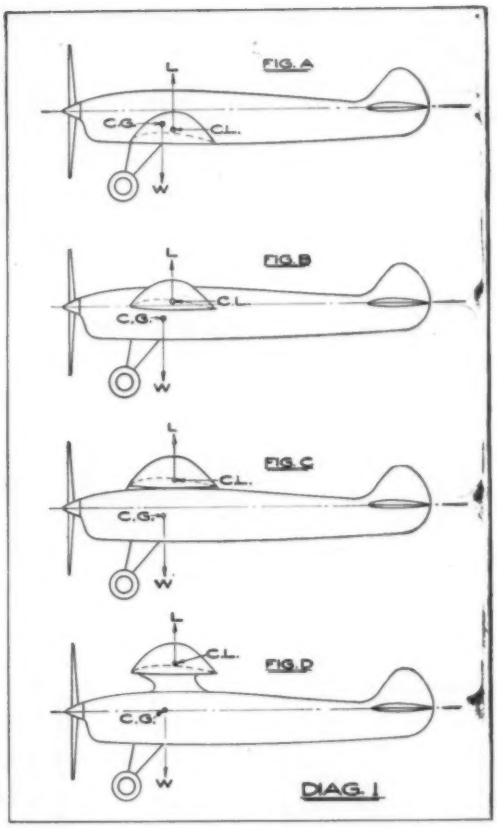
Let us undertake to design a simple model. To do this, certain steps should be followed in proper order. They are as follows:

(1) Determine the purpose.
(2) Select the type of plane best suited to the purpose.
(3) Determine the size of the plane.
(4) Establish the correct proportions so the forces acting upon the plane will generate the greatest amount of lift with the least amount of resistance and so the plane will remain upon an even keel, or return to normal flight position if disturbed in flight.
(5) Lay out the essential parts and the force arrangement of the plane on paper.
(6) Design the structure and draw in the details.

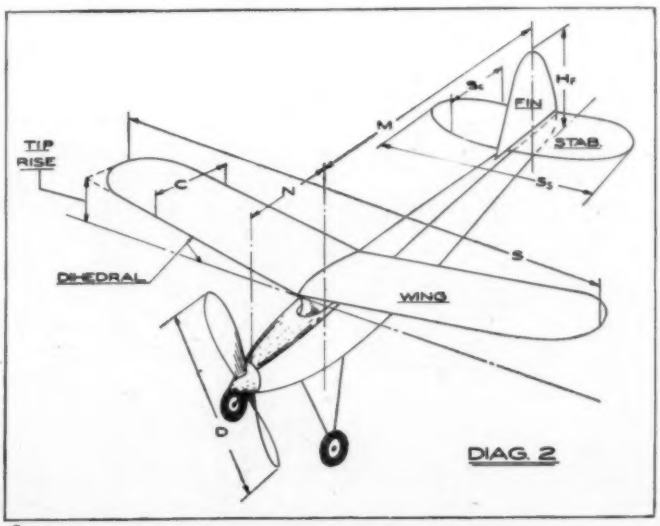
Now let us proceed to design our plane. One, the purpose, should be kept clearly in mind at all times and no feature of design and structure should be considered which does not contribute to it. Here our problem is to design an exceedingly stable yet simple model that may be flown consistently as a sport or practice plane of the fuselage type, all other considerations being secondary.

In establishing this objective, we have also partially established the second

(Continued on page 68)

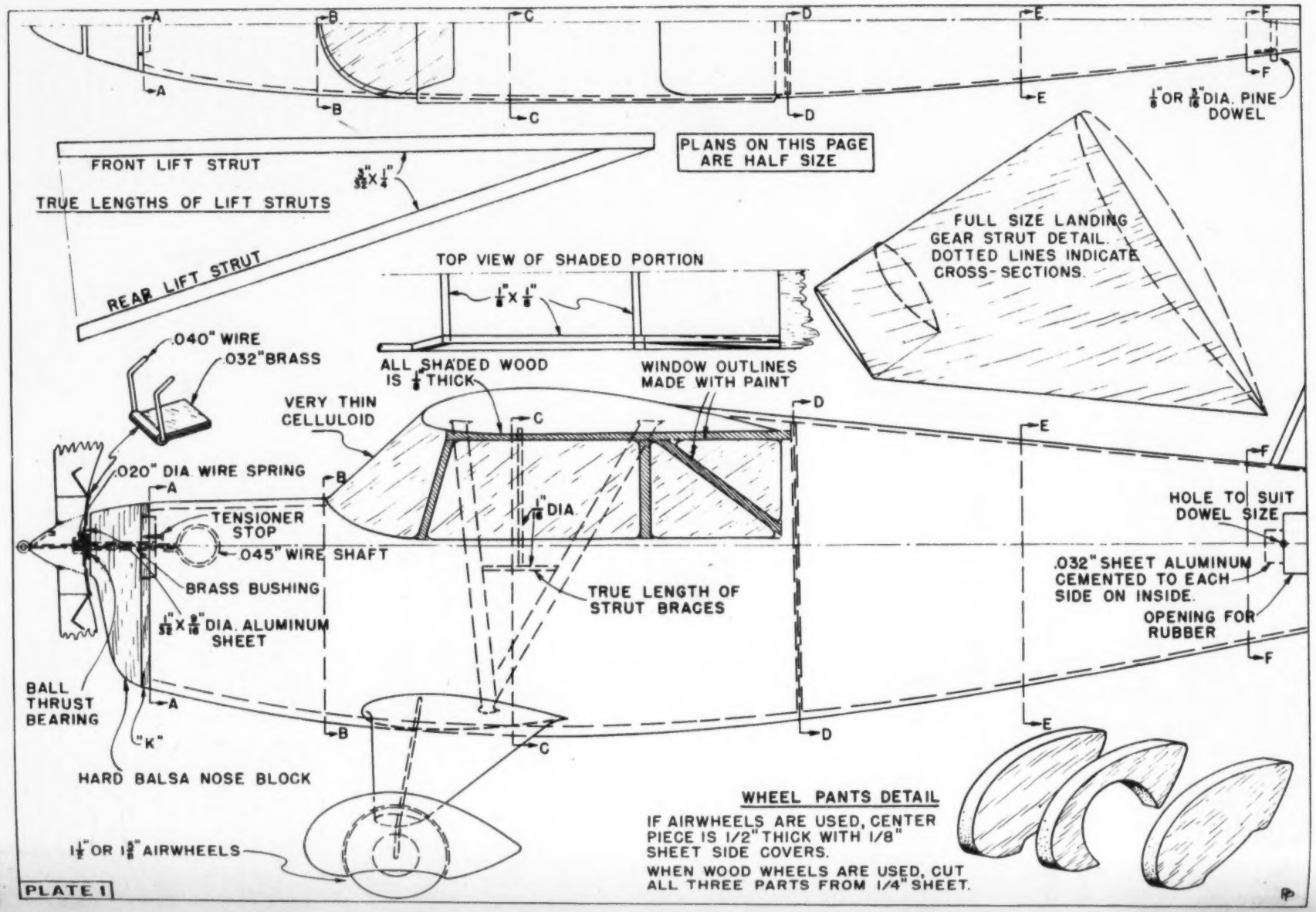


DIAG. 1



DIAG. 2

Copyright 1941 by Charles Hampson Grant


A
B
C
D
E
F
1/8" OR 3/16" DIA. PINE DOWEL
FRONT LIFT STRUT
3/32" X 1/4"
TRUE LENGTHS OF LIFT STRUTS
REAR LIFT STRUT
PLANS ON THIS PAGE ARE HALF SIZE
FULL SIZE LANDING GEAR STRUT DETAIL. DOTTED LINES INDICATE CROSS-SECTIONS.
TOP VIEW OF SHADED PORTION
1/8" X 1/8"
.040" WIRE
.032" BRASS
ALL SHADED WOOD IS 1/8" THICK
WINDOW OUTLINES MADE WITH PAINT
VERY THIN CELLULOID
.020" DIA WIRE SPRING
TENSIONER STOP
.045" WIRE SHAFT
1/8" DIA.
HOLE TO SUIT DOWEL SIZE
BRASS BUSHING
1/32" X 3/16" DIA. ALUMINUM SHEET
TRUE LENGTH OF STRUT BRACES
.032" SHEET ALUMINUM CEMENTED TO EACH SIDE ON INSIDE.
OPENING FOR RUBBER
BALL THRUST BEARING
"K"
HARD BALSA NOSE BLOCK
1 1/2" OR 1 3/8" AIRWHEELS
WHEEL PANTS DETAIL
IF AIRWHEELS ARE USED, CENTER PIECE IS 1/2" THICK WITH 1/8" SHEET SIDE COVERS.
WHEN WOOD WHEELS ARE USED, CUT ALL THREE PARTS FROM 1/4" SHEET.
PLATE 1

Very stable though tail surfaces are made to scale

All details are included, giving a realistic appearance

Rearwin Speedster NATIONALS WINNER

The folding propeller increases its duration

It Has Flown for 120 Seconds—Combining Realistic Appearance with High Performance

By EDWARD NAUDZIUS

THE Rearwin Speedster airplanes manufactured in Kansas City, Kansas, during recent years, have certainly been a model builder's dream-come-true so far as flying scale models are concerned. During the past three "Nationals" a relatively large number of this type has been entered in the Scale Model Event. After comparing the Speedster with other aircraft the reason for its predominance becomes apparent: The features which make the Speedster so desirable are the relatively long fuselage, in-line engine and large vertical tail.

Performance characteristics of the actual Rearwin Speedster, powered with a Menasco 125 horsepower engine, are very good. For its relatively low power it has a maximum speed of 150 mi./hr., a rate of climb of 1300 ft./min. and a ceiling of 1800 ft.

The model of the Speedster seems to have similarly good performance when properly adjusted. The original model weighed approximately seven and one-half ounces when ready to fly, but in spite of this fact flights varying from 90 to 120 seconds have been made consistently: its official flight was 87 seconds at the Nationals. Incidentally, a very interesting incident happened to the original model while making test flights the morning of the Scale Model Event at the Nationals. The model was wound near capacity and launched on a flight which proved to be nearly two minutes. We were happily chasing as it came gliding down like an outdoor cabin model, when, as it approached the ground, we saw it was going to land on a bare spot on the field. We thought surely when it would land it would nose over and damage the covering, because the wheels projected very little below the pants. But to our amazement, as well as our friends, the model alighted on the rather rough ground and came to a stop after a short run: just like a real plane.

Just like a large ship in full flight

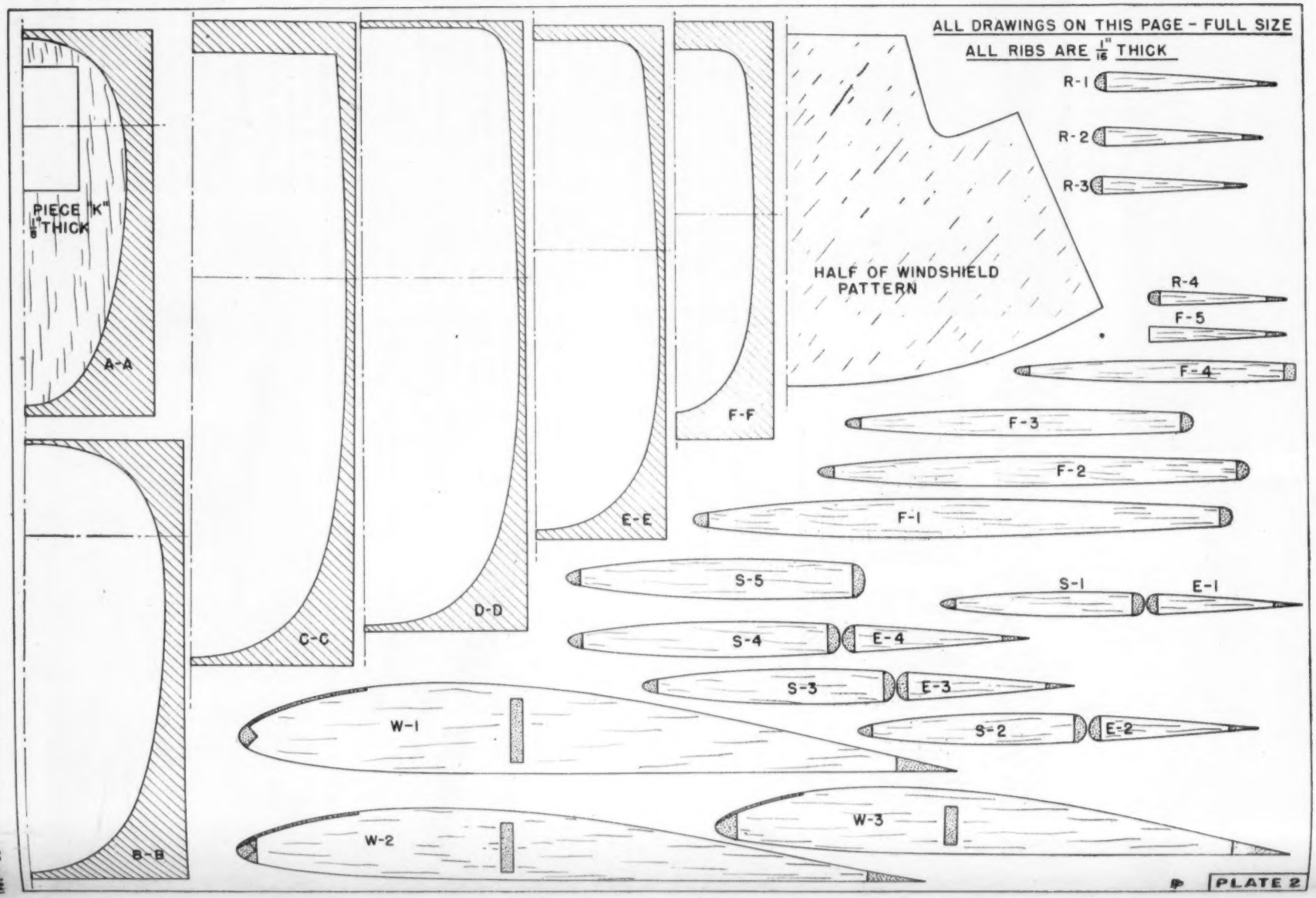
Our airplane was designed with greatest consideration given to ruggedness, stable climb, flat glide and appearance. By following the directions and plans carefully an exact scale model with very good contest possibilities can be made. Before starting any building, make cross section Plates 1 and 3 in 1/4" squares and two large sheets of paper measuring 14" x 20" in 1/2" squares. Then proceed to enlarge the plans to full-size by drawing the lines appearing on the plates through corresponding squares on the large paper.

Author and builder with the plane that outflew all other "scales" at the Nationals

Fuselage

Two blocks 1-1/4" x 4-1/2" x 22" are needed. The blocks should be soft, clear wood such as is used for indoor model propellers. The two blocks are then glued together along the center for a distance of about 8". Next templates for the top and side are made from heavy drawing paper. The top outline is

(Continued on page 38)


ALL DRAWINGS ON THIS PAGE - FULL SIZE
ALL RIBS ARE 1/16" THICK
PIECE "K" 1/8" THICK
A-A
B-B
C-C
D-D
E-E
F-F
HALF OF WINDSHIELD PATTERN
R-1
R-2
R-3
R-4
F-5
F-4
F-3
F-2
F-1
S-5
S-1
E-1
S-4
E-4
S-3
E-3
S-2
E-2
W-1
W-2
W-3
PLATE 2

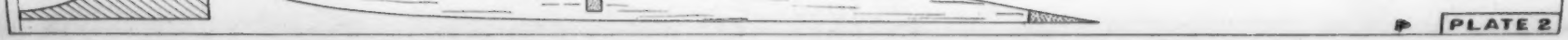


PLATE 2

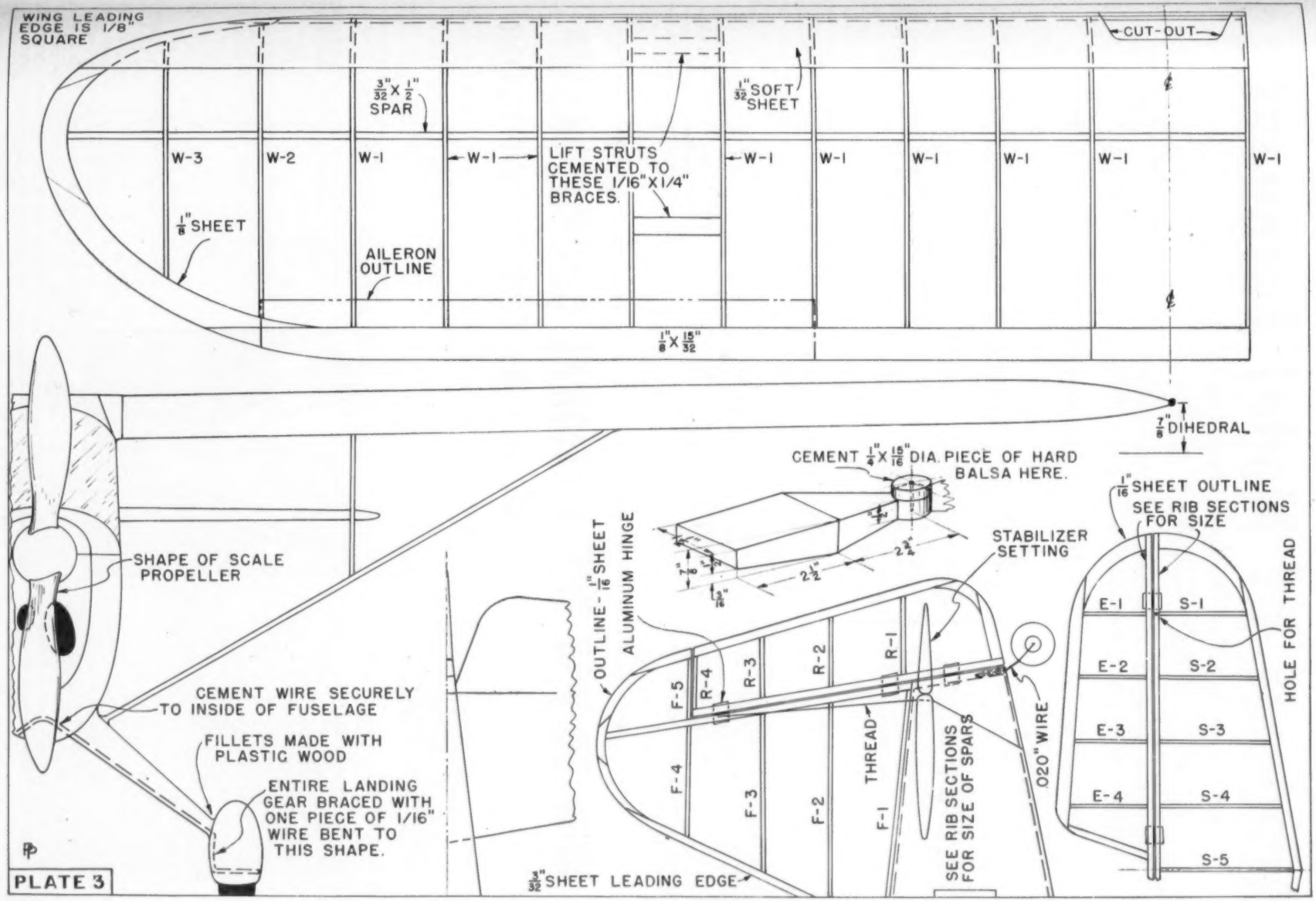


PLATE 3

Academy of Model Aeronautics

A Division of the National Aeronautic Association

OFFICIAL MODEL AIRPLANE NEWS

OFFICIAL MODEL AIRCRAFT REGULATIONS
Governing Sporting Model Aviation in America

ADOPTED BY THE CONTEST BOARD OF THE ACADEMY OF MODEL AERONAUTICS

Copyright 1941 by Academy of Model Aeronautics

Provisions for Issuance.

Under authority of the National Aeronautic Association, American representative of the Federation Aeronautique Internationale, world-wide governing body for all sporting aviation, the following model aircraft classifications and regulations are hereby prescribed by the Academy of Model Aeronautics.

Definitions

MODEL AIRCRAFT. All aircraft of reduced size which are not capable of supporting a human being. Such aircraft are classified as indoor or outdoor models. No restrictions are placed on design of the models except that they shall meet the specifications listed in these regulations. The models must be so designed, however, that they drop no parts in flight or during take-off. Projected area of the stabilizing surface(s) in excess of 50 per cent of the projected area of the supporting surface(s) (wing area) shall be considered as supporting surface for purposes of classification and wing loading requirements.

INDOOR MODEL AIRCRAFT. A model of the indoor type is designed to fly indoors. Indoor models are classified as powered models or non-powered models. There are no weight specifications for such aircraft.

OUTDOOR MODEL AIRCRAFT. A model of the outdoor type is designed primarily to fly outdoors. Outdoor models are classified as powered models or non-powered models. There are weight specifications for all outdoor aircraft. If ballast is used to bring an outdoor model up to the required weight, such ballast shall be permanently affixed to the model.

STICK MODEL. A model of the stick type has a body composed of stick(s), tube(s), or open framework, rather than a fuselage. Models using tubes or framework to enclose the motor(s) shall have a total maximum cross-section area of the tubes or sticks not greater than $L^2/200$, where "L" equals the overall length of the model, excluding the propeller(s).

CABIN MODEL, POWERED. A powered model of the cabin type has built-up enclosed fuselage. The total maximum cross-section area of the fuselage(s) must not be less than $L^2/100$, where "L" equals the over-all length of the model, excluding the propeller(s). The fuselage(s) shall be of streamline form and have not less than 90 percent of its (their) surface area covered. Outriggers and booms may be used. When rubber is used for motive power, it shall be contained entirely within the built-up fuselage. An unfaired tubular

(Continued on page 42)

HOW TO WIN THE NATIONAL CHAMPIONSHIP

A Secret—By THE INSTRUCTOR

QUITE some time ago, in the Feb. '39 issue of MODEL AIRPLANE NEWS as a matter of fact (gee, but we're growing old together quickly), the Instructor handed out a few pointers on how to win meets and influence judges. These should be studied by each potential national model meet champion and the "regulations" followed to the letter.

However, to win a national championship in the model aero field, one must more than design and build good models. One must be (shhh-h-h) a "superman." Reason for this is the point system governing selection of the top-place flyer this coming July at Chicago will take high-place men in each event regardless of age. So best all-round flyer may be 14 or 40, but regardless, he's going to have to work mighty hard to win the title of National Champion.

To lessen his load (or yours, if you've decided to capture that title) we herewith present a couple of suggestions:

First of all go to Chicago with completely built and tested models; don't rush out there with half a dozen half-finished models and expect to complete them in between times. The national meets have grown so they're "big time" stuff and it's no longer possible to stroll casually from the field, put a model together and return to win the contest.

Each model designed and intended for national meet competition should be thoroughly tested to eliminate adjustment "bugs" which creep into the best designed model aircraft. It's not necessary to pretest your models in meets or even make record-breaking flights with them. Some regular flying about dusk, when the thermals have turned in for the evening, will enable you to properly adjust your outdoor models. Once the proper set-ups such as incidence and wing location have been determined, mark in ink the exact location of the wing, prop-shaft line, and so on so the next time you assemble the models you won't overlook what you have so carefully determined—the correct adjustment of the craft.

George Sass Jr., 1940 National Champion of Detroit receives Champion Trophy from N. R. Thurston, Pres. of Nat. Exchange Club. Who will win the Trophy in 1941?

Now Chicago the first week in July is apt to be plenty hot so we don't want to see you running around under a scorching sun looking for spare parts or an extra rubber motor or another spark plug or another booster battery or another—well, you get the idea. Go to the Nationals well-prepared for all eventualities and/or emergencies with spare parts for your contest entries and the proper tools with which to win.

To the Instructor an outdoor model is never complete until its owner's name and address has been affixed. And those indoor

(Continued on page 34)

The B-17D, latest 4-motor flying fortress. Its speed exceeds 300 m.p.h.; equipped with 1200 hp. engines, armor plate and leakproof tanks

The 380 m.p.h. high altitude Republic YP-43 pursuit

FRONTIERS

Highlights of the Latest Developments in Aviation

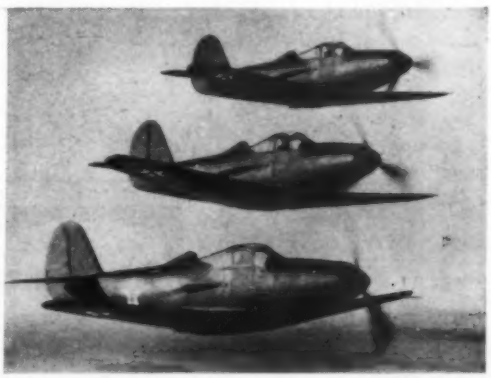
By ROBERT C. MORRISON

GREAT BRITAIN, beneath the shadows of war, has placed in operation a new general reconnaissance and torpedo bomber to impend a further damper on Nazi hostilities. Measuring 59 ft. in wingspread, the airplane is of the twin-engine, high-wing type with much the same general appearance of Stearman's YA-21 attack-bomber which participated in the famous knock-down and drag-out procurement competition of a few years ago. It is Blackburn Aircraft's, who built the Skuas, latest contribution to a worthy cause. Named the "Botha," and perhaps some day to intermingle with the German Gothas, the bomber is powered by two Bristol Perseus sleeve-valve engines that deliver 900 hp. each. In other words, it is not the fastest thing on wings but it will make a good reconnaissance airplane. For just what reason Great Britain should want a new flock of torpedo bombers we do not know, but we can see where the Botha will be put to good use watching over British shipping and her scattered and "hung in the balance" territories.

These Bothas are already enough in abundance to form squadrons and is a typical example illustrating that Great Britain has been able to produce many of her new aircraft in utmost secrecy. Due only to the fact this plane is not of the super high-speed, Nazi-whittling variety, word of its existence has leaked out. The British are very serious about keeping details of new aircraft to themselves these days; many a Nazi flier has already been amazed to run into combat with a new British "Super Solution."

The length of the Botha is 51 ft. and height is 18 ft. 3 in. The fuselage might be described as rectangular in cross-section with the edges slightly beveled. The spacious windshield has rather sharp features, perhaps because thick, flat, bullet-proof glass is employed. A row of very small portholes on each side of the fuselage is apparently the only means of conveying light to the interior. A man-size power turret with two machine guns is mounted atop the fuselage, just aft the wing's leading edge and has that vicious "stay away" look. On the tail is mounted one rudder, and it appears to be permanent . . . with no revisions, additions or subtractions forthcoming. That is rather odd. In this country if the final rudder that is placed on an airplane

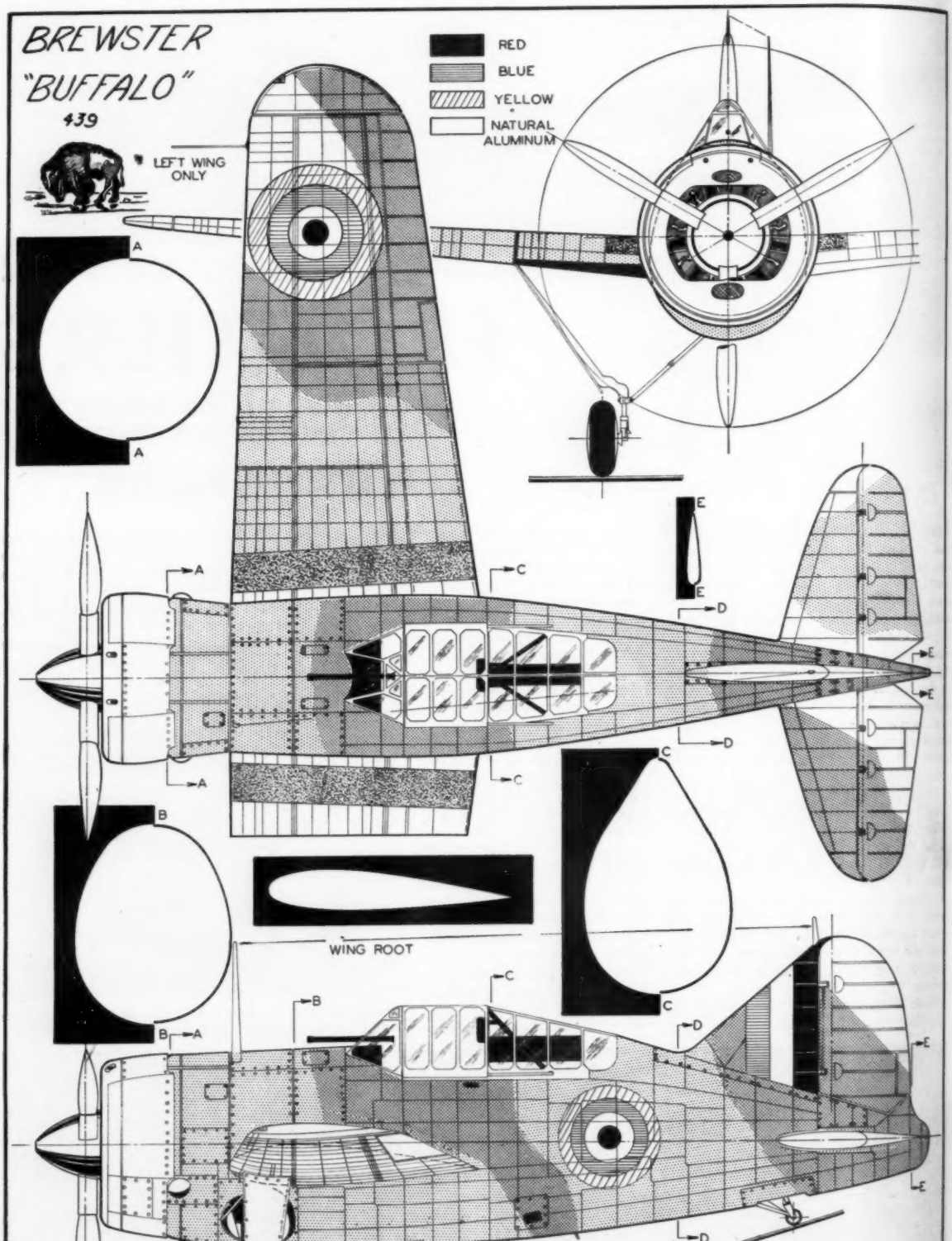
(Continued on page 52)

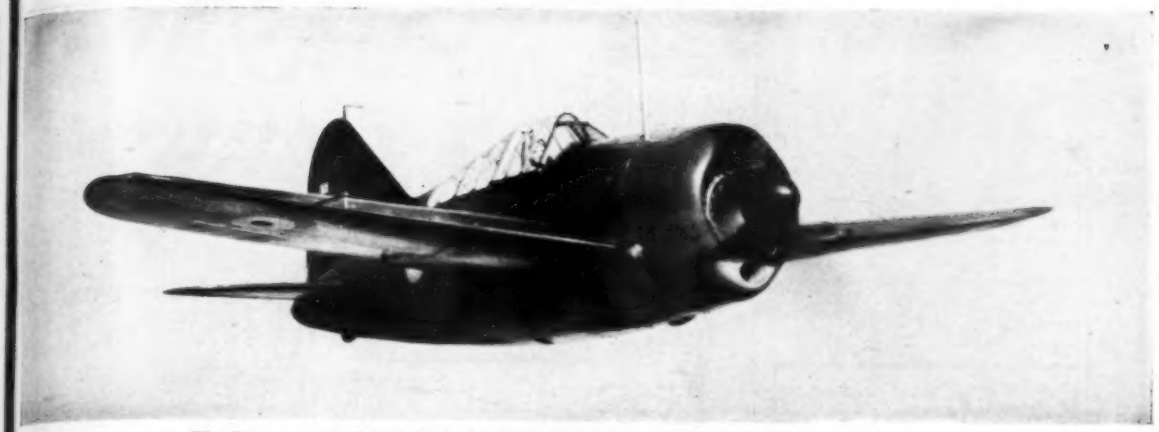


Three Aircobras on their first flight. A cannon and battery of machine guns make them formidable fighters

Curtiss P-40 pursuits being turned out "en masse": ten planes per day. The British pronounce them the Spitfire's equal

Navy N-3-N, 265 h.p. training planes being given a workout by three of the 40 students of the Floyd Bennett Navy Base


BREWSTER
"BUFFALO"
439
LEFT WING ONLY
RED
BLUE
YELLOW
NATURAL ALUMINUM
A
B
C
D
E
WING ROOT
WING TIP
SCALE
0 ½' 1' 2' 3' 4'
ROBERT C. LARREN



The Brewster "Buffalo," single place pursuit plane, now battling the Nazis for Britain

Thundering Sky Herd

THE PLANE ON THE COVER

By ROBERT McLARREN

IT WAS high noon. The shade of the scattered trees along the single main street of the tiny Connecticut township offered little relief to the two young ladies hurrying towards the town's only church. It was a Sunday morning in 1803. Two thousand miles to the unknown, forbidding West roved the huge herd of the buffalo. Suddenly, the smaller of the pair glanced around at the heavy thud of horses hoofs as a carriage moved up the street at a rapid pace. Oddly, it slowed as it neared them and a handsome young man bowed, tipped his hat and hurried on with a smile exposing his even, white teeth.

"Elizabeth, who was that?" the taller of the pair questioned her companion.

"That, my dear, was young James Brewster. He built that handsome carriage himself!" the smiling young lady replied.

And young James Brewster continued to build carriages. As his business grew, he moved south to New York and in 1826 he opened a branch shop in New York City on Broome Street.

For more than twenty years the firm was known as Messrs. Brewster and Co. (Broome Street) to distinguish them from the dozens of competitors and imitators who sprang up, some even using the name Brewster in order to steal business and profits from them!

In 1846 the growing firm moved uptown to a huge building which occupied what is now the entire block on Broadway between 47th and 48th Streets. Here the enterprising firm became far-and-away the leading carriage-makers in the fast-growing United States, and at this time they developed a new and lasting color known as Brewster Green.

The company prospered even during the trying depression years following the Civil War and in 1869 sent 13 different types of carriages to the Paris Exposition; winning

(Continued on page 56)

AIR YOUTH OF AMERICA

Important News About Modelers

FORTY young men and a girl were presented with certificates of achievement in junior aviation by Major Donald Hudson of the U. S. Air Corps, at ceremonies marking their completion of the training course conducted by Air Youth of America. The presentation was made at the Museum of Science and Industry, New York City, where the group had been at work for two months. Each member of the Air Youth training course represented a school, club or neighborhood group, and is now prepared to act as group leader upon returning to his particular community.

"You young people can become the leaders of a national campaign to make the Youth of America the most air-minded generation the world has ever seen," Major Hudson told the group in presenting them with their certificates.

Each member of the course has completed the construction of at least four Air Youth model planes and some of the more advanced had begun construction of gas jobs. Several teachers and camp leaders who are planning to organize model airplane clubs with their groups also participated in the course.

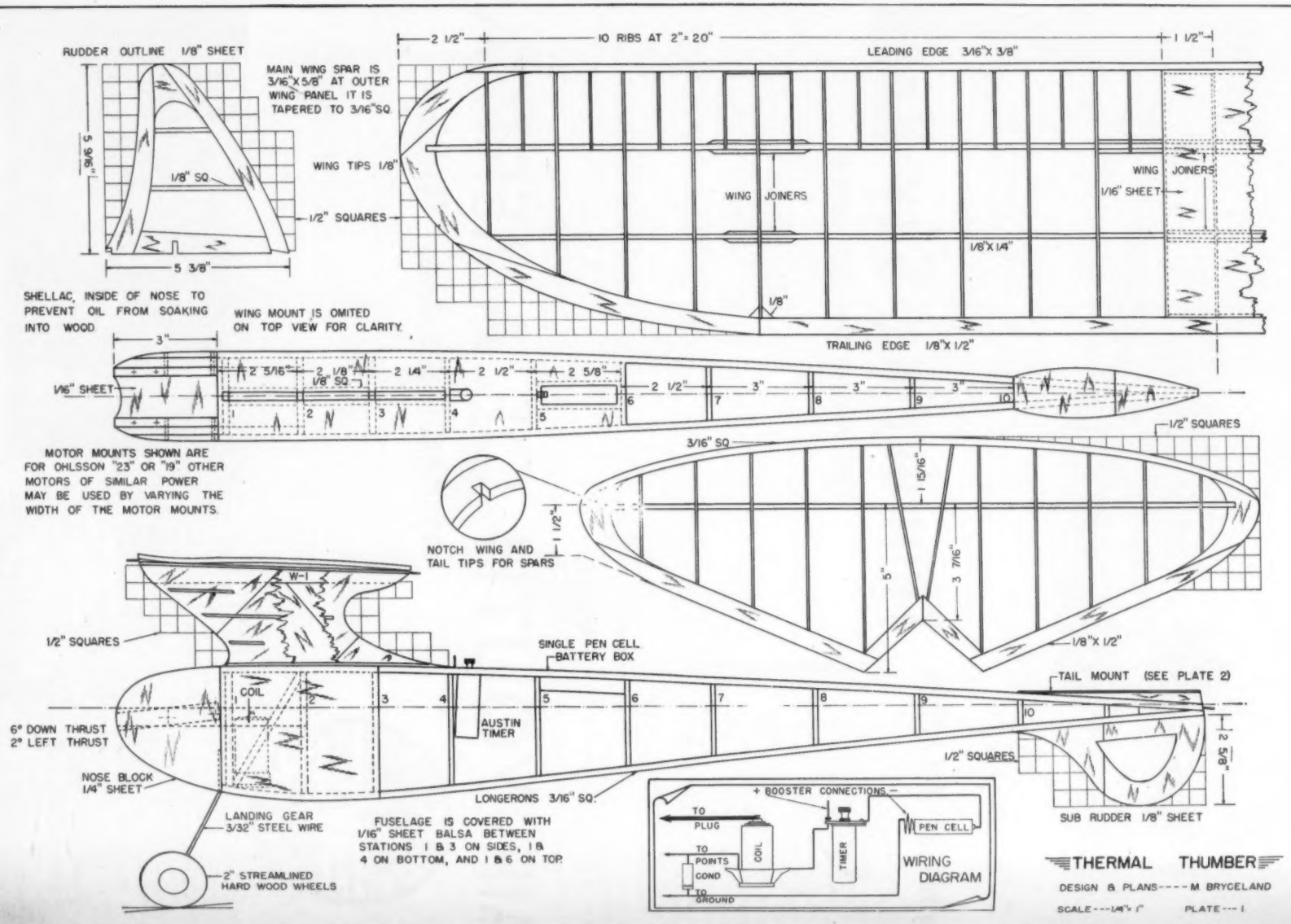
First Officer J. W. Stowell, veteran pilot of American Airlines, was also present on the occasion and told the model builders some of his flying experiences: a very inspiring talk.

Sixteen States Sign Up For Air Youth Events

Prospects for an outstanding year in the flying of rubber powered planes are in sight, according to Art Vhay, who an-

(Continued on page 38)

Maj. Donald Hudson of U.S. Air Corps presents awards for accomplishment to members of Air Youth Training Course as J. W. Stowell of American Air Lines looks on


RUDDER OUTLINE 1/8" SHEET
5 9/16"
1/8" SQ
5 3/8"
MAIN WING SPAR IS 3/16"X5/8" AT OUTER WING PANEL IT IS TAPERED TO 3/16"SQ
WING TIPS 1/8"
1/2" SQUARES
2 1/2"
10 RIBS AT 2"= 20"
1 1/2"
LEADING EDGE 3/16"X 3/8"
WING JOINERS
WING JOINERS
1/16" SHEET
1/8"X 1/4"
1/8"
TRAILING EDGE 1/8"X 1/2"
SHELLAC, INSIDE OF NOSE TO PREVENT OIL FROM SOAKING INTO WOOD
WING MOUNT IS OMITED ON TOP VIEW FOR CLARITY.
3"
1/16" SHEET
2 3/16"
2 1/8"
1/8" SQ
2 1/4"
2 1/2"
2 5/8"
2 1/2"
3"
3"
3"
1
2
3
4
5
6
7
8
9
10
MOTOR MOUNTS SHOWN ARE FOR OHLSSON "23" OR "19" OTHER MOTORS OF SIMILAR POWER MAY BE USED BY VARYING THE WIDTH OF THE MOTOR MOUNTS.
NOTCH WING AND TAIL TIPS FOR SPARS
1 1/2"
3/16" SQ
1/2" SQUARES
1 15/16"
5"
3 7/16"
1/8"X 1/2"
W-1
1/2" SQUARES
SINGLE PEN CELL BATTERY BOX
TAIL MOUNT (SEE PLATE 2)
COIL
AUSTIN TIMER
6° DOWN THRUST
2° LEFT THRUST
NOSE BLOCK 1/4" SHEET
LANDING GEAR 3/32" STEEL WIRE
2" STREAMLINED HARD WOOD WHEELS
LONGERONS 3/16" SQ.
FUSELAGE IS COVERED WITH 1/16" SHEET BALSA BETWEEN STATIONS 1 & 3 ON SIDES, 1 & 4 ON BOTTOM, AND 1 & 6 ON TOP.
1/2" SQUARES
2 5/8"
SUB RUDDER 1/8" SHEET
+ BOOSTER CONNECTIONS
TO PLUG
TO POINTS
COND
TO GROUND
COIL
TIMER
PEN CELL
WIRING DIAGRAM
THERMAL THUMBER
DESIGN & PLANS---- M BRYCELAND
SCALE---1/4"= 1" PLATE--- 1

THERMAL THUMBER

This Class A Gas Job Is Easy to Build and Will Win Contests for Novice or Expert

By MAURICE BRYCELAND

Actual picture of plane gliding in to a landing

IT IS necessary, besides having time to construct this ship, to have a really serviceable pair of lungs and an automobile. It has been our misfortune that, besides breaking a car-spring chasing across the flying field's rough terrain, to also experience subsequent stiffness and sore lungs from chasing the model on foot. The original model was lost on a 6.05 min. test-flight at Hadley Field, New Jersey. This occurred on the fifth test flight, while attempting to secure proper flight adjustments. After searching two days, we gave the model up for lost and went back into the work-shop to build another.

At the next contest at Hadley Field on its first flight, the ship lived up to advance efforts, ringing up a flight of 3:55 min. Unfortunately motor trouble developed, preventing any more official flights. The following week, after an official flight of 3:12 min., the engine "seized on" the run-way necessitating a change of motors and a subsequent test flight to see if any variance had occurred in the thrust line. This flight on a nine-second engine run disappeared 17 min. 11 sec. later. To date we have not had word of either the models—and was getting tired of making one a week and losing it over the week-end.

A close friend, impressed with the potentialities of the Thermal Thumber, had already started building one in anticipation of the annual contest at Creedmore, Long Island. At this contest, after two test flights, the Thermal Thumber "jinx" was finally broken when he got in three "officials," thereby clinching *first place*. On the last official she flew out-of-sight after 4:58 min., but our luck held as it was later returned to us by Gorden Murray of the Sky-Scrapers, who "fished" it out of Lake Success.

Some other adventures of the Thermal Thumber were:

On November 17, 1940, the Thumber took 1st, 2nd and 3rd at the annual "Frost Bite" Gas Model Contest sponsored by the Vineland Aeronauts at Bucks Flying Field, Woodruff, New Jersey.

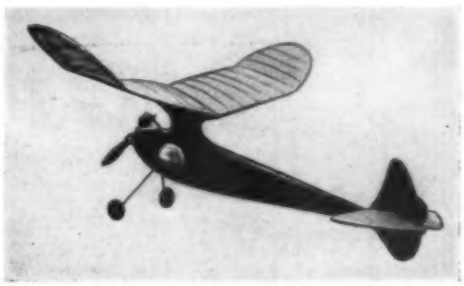
1st in Class A was taken by Andy (Yuditsky) Stavast of Bloomfield, New Jersey. The outstanding feature of this was that the model was completed the night before the meet and it was Andy's first contest.

2nd in Class B was won by Walt Schroder with his perennial contest winner. This is the same plane that performed so sensationally at the annual Creedmore meet.

3rd in Class B was won by partners Ollie Hibbens and Andy Stavast.

All the above are members of the Strato-Bums of Bloomfield. It might be well to note that the "Bums" took five of the nine open places in this contest.

It embodies the simplest construction



Light, simple and a consistent flier

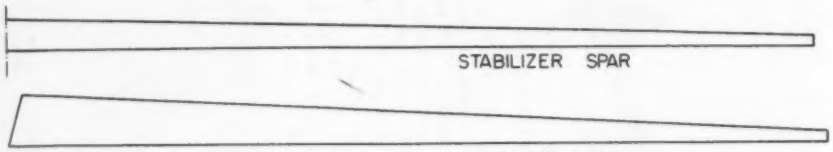
Building and Flying

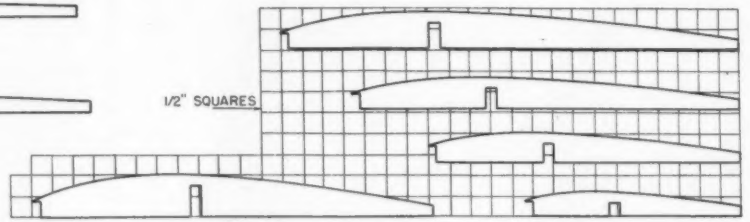
The first step in building the Thermal Thumber is enlarge the plans to the required size. This may be done on anything from brown paper to regular drawing paper; we have even used wall-paper on some occasions. The 1/8" squares, shown on plate one should be enlarged four times to 1/2" squares. The easiest way to do this is purchase some 1/4" square graph paper, the kind you use in high school algebra, and use two squares for every one shown on the plan. In plotting the outline of the various tips a pair of dividers comes in very handy, but if

(Continued on page 50)

Here she comes after a six minute trip to the clouds

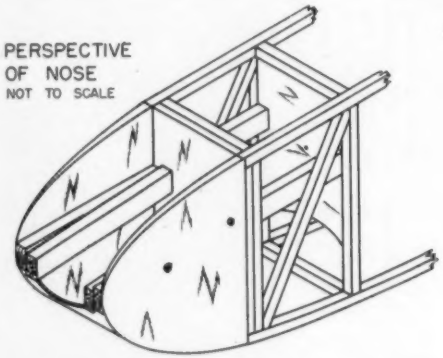
The uncovered framework shows simplicity and strength



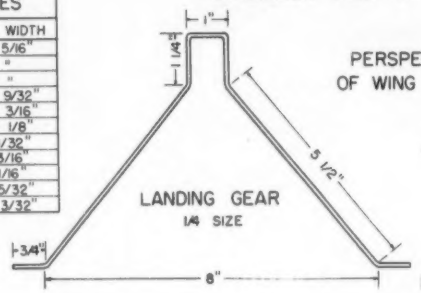


STABILIZER RIBS MAKE 2 OF EACH FROM 1/16"

PERSPECTIVE OF NOSE
NOT TO SCALE

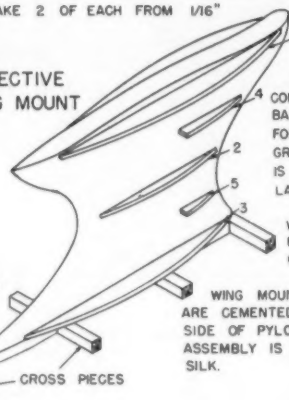


FUSELAGE ORDINATES			
STATION	UPPER	LOWER	1/2 WIDTH
1	1 3/16"	2 7/16"	1 5/16"
2	1 7/32"	2 3/4"	"
3	1 3/16"	2 11/16"	"
4	1 5/32"	2 1/2"	1 9/32"
5	1 1/16"	2 7/32"	1 3/16"
6	31/32"	1 15/16"	1 1/8"
7	13/16"	1 5/8"	31/32"
8	11/16"	1 5/16"	13/16"
9	9/32"	1 1/32"	11/16"
10	3/8"	3/4"	15/32"
END	0	5/16"	3/32"



LANDING GEAR
1/4 SIZE

PERSPECTIVE OF WING MOUNT

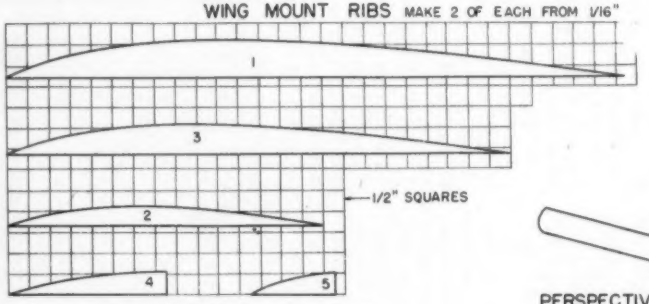


WING MOUNT IS CONSTRUTED OF 3 PLY BALSA (SEE PLATE I FOR DIRECTION OF GRAIN). INNER LAYER IS 1/8" SHEET, OUTER LAYERS ARE 1/16"

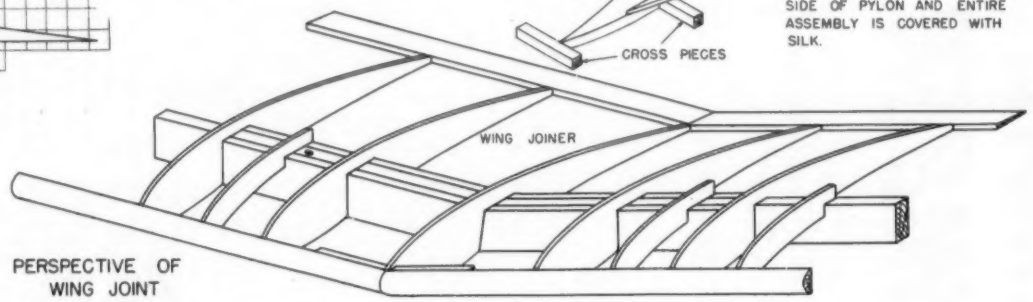
WING MOUNT CRADLE NOT SHOWN FOR CLARITY.

WING MOUNT RIBS 1 TO 5 ARE CEMENTED IN PLACE ON SIDE OF PYLON AND ENTIRE ASSEMBLY IS COVERED WITH SILK.

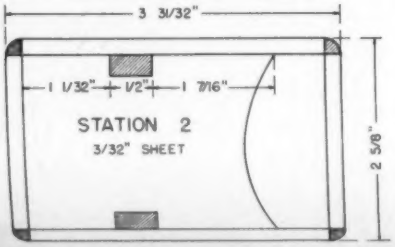
WING MOUNT RIBS MAKE 2 OF EACH FROM 1/16"



CROSS PIECES

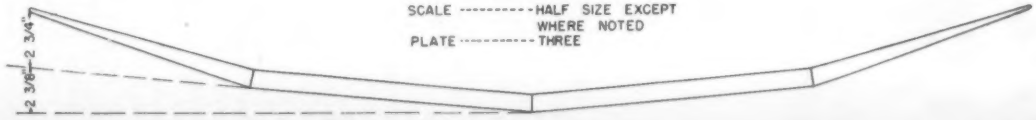


PERSPECTIVE OF WING JOINT
NOT TO SCALE



THERMAL THUMBER

SCALE ---------- HALF SIZE EXCEPT WHERE NOTED
PLATE ---------- THREE



POLYHEDRIAL

M.B.

POLYHEDRIAL

M.B.

FALSE RIB
MAKE 14 FROM 1/16" SHEET

MAIN WING RIB
MAKE 15 FROM 1/16" SHEET

WING MOUNT W-1
1/8" HARD BALSA

STABILIZER RIB NO. 2
MAKE 2 FROM 1/16" SHEET

FIREWALL
1/8" PLYWOOD SHOWN 1/2" SCALE

THERMAL THUMBER
SCALE--------FULL SIZE EXCEPT WHERE NOTED
PLATE----TWO

HI-TENSION LEAD

TAIL MOUNT
1/16" SHEET

TAIL BLOCK
MAKE 2 FROM 1/8" BALSA

NOTE WING & TAIL MOUNT HAVE GRAIN RUNNING PARALLEL TO SPAN

WING MOUNT
4 PIECES 1/8"X 2"

GAS LINES

AIR WAYS

NEWS OF MODELS AND BUILDERS FROM ALL PARTS OF THE WORLD

Pict. 1. Fred Frazier's small gas model "riding high" on the back of Lee Sherman's larger one. (Three Lions Photo)

DURING the past eight years, through the pages of MODEL AIRPLANE NEWS, over one million model builders have been trained in the science of aeronautics.

A vast reservoir of aeronautical workers, scientists and engineers have been developed; thousands of them now are using information gained through experimenting with models to speed up our vast aeronautical defense program. They are rendering an invaluable service and if these young men had not become aeronautically-minded and acquired vast and important information on aviation, the industry and, in fact, our country would now be at an extreme disadvantage.

The large aircraft industry has not credited model aviation in the past with its full value; in fact, it has ignored it, using the term "child's play." Nothing could be farther from the truth than this; for the simplest scientific object can serve a child or a scientist at the same time. The object does not determine the use to which it is put but rather does the man who uses it.

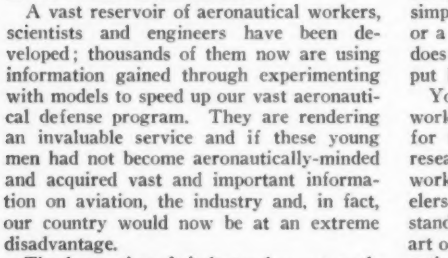
Young men have been using models to work out valuable aeronautical problems for themselves and others in the field of research. Many problems have been worked out through this medium and modelers have gained a fundamental understanding of principles of flight as well as the art of airplane construction through participation in this activity. Of course, there are very young boys who "play" with models, but it is this phase which stimulates their imagination and intrigues their interest so that they follow, through their formative years, this great instructive hobby; acquiring, without effort, a foundation of knowledge that becomes of immense value when taking up an aeronautical career.

In the past many of our foremost engineers and designers have been model builders and the future holds even greater possibilities for those who begin their aviation career in this manner.

The industry is destined to improve under the surge of new ideas which they will inevitably inject into it, and as time progresses members of the large industry will look upon the model builder with increasing respect, though notice has been slightly belated; hardly to its credit.

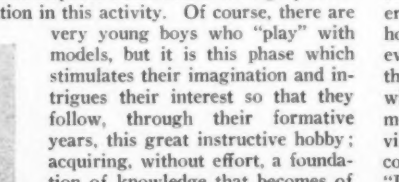
At this urgent time, in which America must create an aerial defense, MODEL AIRPLANE NEWS calls upon every model builder to put forth his best efforts and use his hobby to further the defense of America at every opportunity. New ideas are valuable, though many of them may not be received with enthusiasm. Apparently there are men in high positions who are unable to visualize and evaluate the many new ideas coming to them. They follow a policy of "If it is not in the book it isn't so"; consequently a persistent course must be followed to gain their attention and recognition. No matter what the difficulties you encounter, do not give up but continue your worth-while efforts.

MODEL AIRPLANE NEWS will be pleased at any time to help you with any difficult problems.



Pict. 2. Norman Davis' biplane hydro gas job

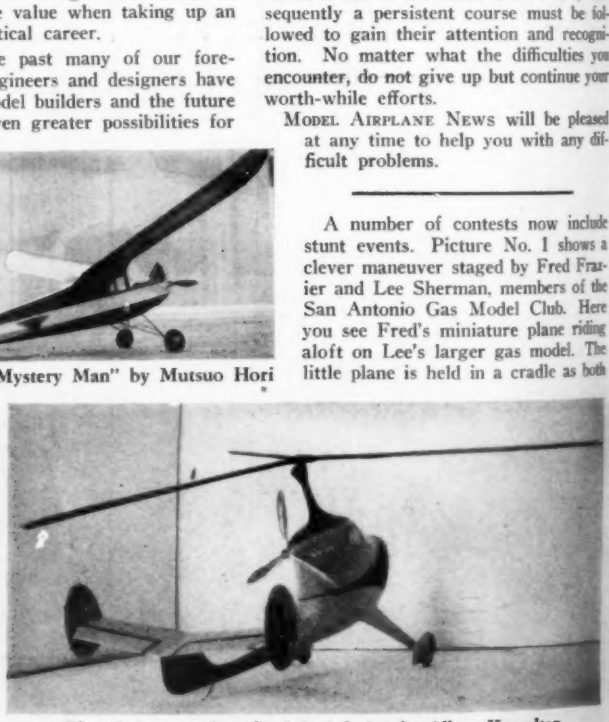
Pict. 3. Paul Wigginton's model "Cub"



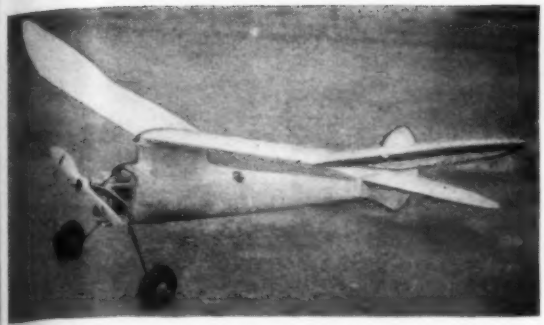
Pict. 4. A "Mystery Man" by Mutsuo Hori

A number of contests now include stunt events. Picture No. 1 shows a clever maneuver staged by Fred Frazier and Lee Sherman, members of the San Antonio Gas Model Club. Here you see Fred's miniature plane riding aloft on Lee's larger gas model. The little plane is held in a cradle as both

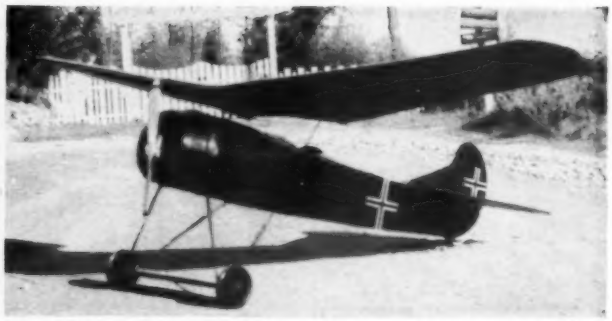
Pict. 5. A carefully detailed prize-winning Laird Racer



Pict. 6. An autogiro of original design by Albert Knowlton



Pict. 7. Charles Warren's KGS; a stable consistent flier



Pict. 8. T. Enticknap's scale gas model of a World War Fokker D-8

ships take off. After a certain time, when the ships have reached altitude, a timer operates to release the small plane from its mooring, which immediately leaves the "mother ship" and flies on a course of its own. The large plane is equipped with an Ohlsson "60"; the small one with an Atom. Motors are set for a 20-second run while the release-timer is set for 10 seconds.

Picture No. 2 is indicative of the modelers' trend toward building something different! It is a hydro biplane gas job. The ship weighs 30 oz., has 40 in. wing span and is powered with a Forster "29." This little plane was built by Norman W. Davis of Red Hill Road, New City, N. Y. Davis is an ardent model fan and takes great pleasure in working out new ideas, such as is represented in this ship. Concerning model flying, he makes some interesting comments:

"Would joining the Academy of Model Aeronautics restrict me in designing models though they are not to be entered in contests?"

The answer is "Certainly Not!" The object of the A. M. A. is to promote the sport, not restrict it. The Academy rules apply to models flown in contests. A model builder can fly when and how he chooses provided it is experimental work, carried on in places which are not objectionable to owners or any one residing in the neighborhood. There are many wide open spaces in the Middle West and West where experimental flights may be made without danger to any one or any thing except the model itself. Davis continues:

"I believe in organized sport but since I fly out in the country, in a field far from buildings or highways and on a lake, I see no danger in light wing loadings or long motor runs. However, I have had most success with rather heavy loadings, up to 12 oz. I usually fly my seaplane with a motor run of over 20 seconds."

Davis also wishes to know what is the most stable airfoil for models. This cannot be determined without exhaustive tests. However, there are a number of airfoils which give sufficient, and, in fact, remarkable, stability. The Clark Y is such a one, as well as the Grant X-8, X-9 and X-10. Stability usually results from the airplane's proportional design and very little from the airfoil.

Picture No. 3 shows again the trend of gas modelers toward building scale jobs. Here is a Taylor Cub, powered with a Dennymite motor, built by Paul Wigginton of 738 S. 9th Street, Cambridge, Ohio. Wigginton has made a number of excellent flights with this ship and is now saving it for better flying weather.

Probably our old readers will remember the "Mystery Man," designed by Elbert J. Weathers, plans of which appeared in MODEL AIRPLANE NEWS. Well, picture No. 4 shows a beautiful model of this plane built by Mutsuo Hori of 946 Kaheka Lane, Honolulu, Hawaii. It is a fine piece of workmanship and Mr. Hori has had many fine flights with it.

At first he installed an original device; a retractable landing gear. Five seconds after leaving the ground the gear folded back in the fuselage and remained retracted during power-flight and glide. However, a bad crash resulted from this device; consequently the ship, when rebuilt, was equipped with the conventional type gear. The model weighs 59 oz. and has a wing loading of 14 oz. The heavy loading apparently does not hinder the steep, left-hand, corkscrew climb which characterizes the ship. Powered with a Brown Jr. motor, it uses a 14-in. propeller. It is beautifully decorated with red and metallic-blue lacquers, having a chrome-plate finish running between them. The two wing panels and tail assembly are removable, making transportation an easy

(Continued on page 60)

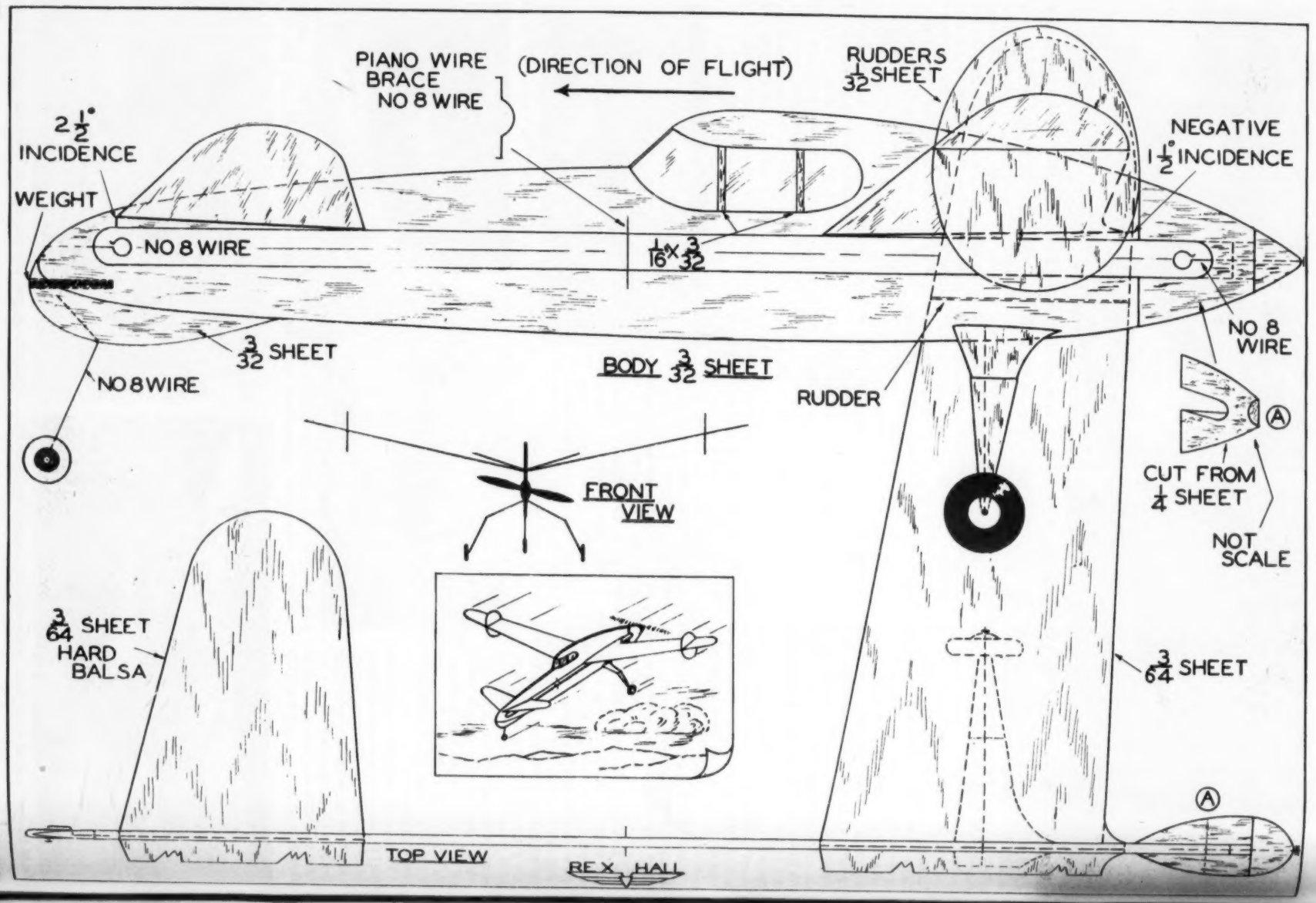
Pict. 9. J. Chandler's Soaring Eagle uses small floats

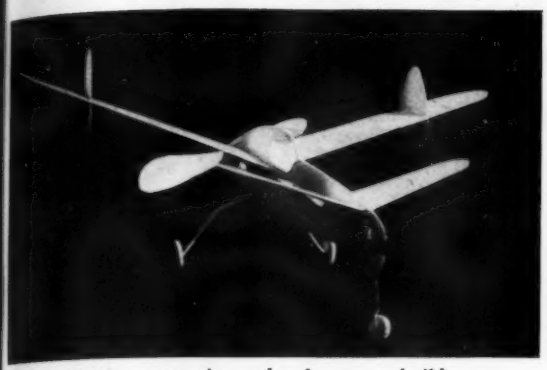
Pict. 10. James Arnold's hydro rises from the water in 60 ft. with these comparatively large floats

Pict. 11. Scale models in flight provide a real thrill. Here is Bill Hyland's scale SE-5

Pict. 12. One learns much of airplanes when building a scale Hawk like this

Pict. 13. A perfectly detailed 48" Seversky pursuit plane


PIANO WIRE BRACE NO 8 WIRE
(DIRECTION OF FLIGHT)
RUDDERS 1/32 SHEET
2 1/2° INCIDENCE
WEIGHT
NO 8 WIRE
1/16 X 3/32
NEGATIVE 1 1/2° INCIDENCE
3/32 SHEET
NO 8 WIRE
BODY 3/32 SHEET
RUDDER
NO 8 WIRE
A
CUT FROM 1/4 SHEET
NOT SCALE
FRONT VIEW
3/64 SHEET HARD BALSA
3/64 SHEET
A
TOP VIEW
REX HALL



Simple construction makes it easy to build

Interesting to fly because of its unusual design

The little sportster in full flight

THE PROFILE "PUSHER"

A Simple Plane of Unique Design that Will Intrigue the Novice or Expert With its Fine Performance

By REX HALL

MOST model builders are always looking for something new and different. Well –here it is.

In presenting this little pusher many may be rather skeptical of its flying ability but, when completed and flown, be prepared to have it exceed all expectations in flight, stability, climb and glide. This model offers something new, drawing upon the future for its design. Pushers have a reputation for fast climbing and this little model lives up to it. On its fourth flight it obtained a height over a hundred feet and covered a distance of approximately two hundred and fifty feet.

In designing this little ship it was necessary that it rest on the ground in a horizontal position. However, this did not hinder its operation in any way; on the contrary, made possible better landings and take-offs.

Profile construction is used for the sake of simplicity, which simplicity can be appreciated by constructing the fuselage first.

Fuselage Construction

The fuselage pattern can be traced from a piece of transparent paper, on which the drawings have been traced. The fuselage, which is cut from a piece of 3/32" sheet, necessitates the use of a sharp razor blade. Care should be used when cutting out small sections such as the front and back wing placements. The center section, which houses the rubber motor, should be cut out with the use of a straight-edged instrument to obtain a straight cut. The cabin is also cut out; later braced and covered with celluloid.

The section on the fuselage which is marked A should be made next. This section is comparatively simple, consisting of two small pieces of 1/4" sheet balsa, which are cut to form and cemented to each side of the fuselage. When this is done only a small opening is left for the nose plug. If opening is too large this is easy to correct by cutting down the back section of the nose plug to 3/32" thickness.

If desired a nose plub can be hand-carved from a piece of hard balsa. This is done comparatively easy by gluing a small balsa block on the rear end of the fuselage. After the cement has set, cut down the plug to match the contour of the nose. Naturally, hard balsa is used for this plug because of the strain caused by contacts with the ground, etc. However, due to weight, sections are medium balsa, except where otherwise specified.

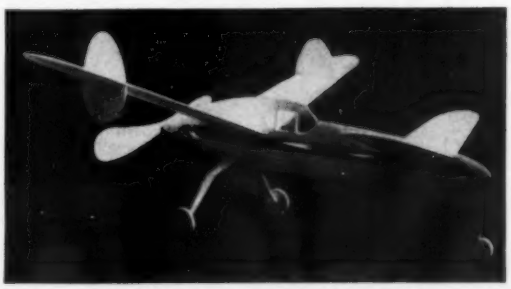
Wings And Rudders

The wings are comparatively simple to build. A complete plan view of the right wing is shown. By going over its outline with a hard pencil, applied with sufficient pressure, it should be transferred on the balsa. You may use the same plan to build the left wing panel. The wing is made of 3/64" sheet medium-hard balsa, in two halves, and later joined at the center. Round the leading and trailing edges with sandpaper; this will give the model better flying qualities.

After the panels have been cut, a straight line should be marked 2-1/2" from each tip for the location of the rudders. Care should be given to this because each rudder has to be in perfect alignment. Upon completion of the main wing the front wing is constructed next. This small front wing is important; it acts the same as a main wing on an ordinary plane. This small wing is made of 3/64" hard balsa. Hard balsa is used because this is the section most likely to come in contact with obstacles while in flight. Use balsa which has a stringy grain; it usually is tougher. This also is made in two pieces and later joined at the center.

The rudders are made of 1/32" medium-hard sheet. It is advisable to take care when cutting out the small openings which clamp over the wing panel.

By referring to the drawing, the builder will note the rudders are not made in two pieces, but small notches are cut into each rudder. When these have been cut out the rudders should clamp tightly over each wing panel.



All balsa, yet realistic in appearance

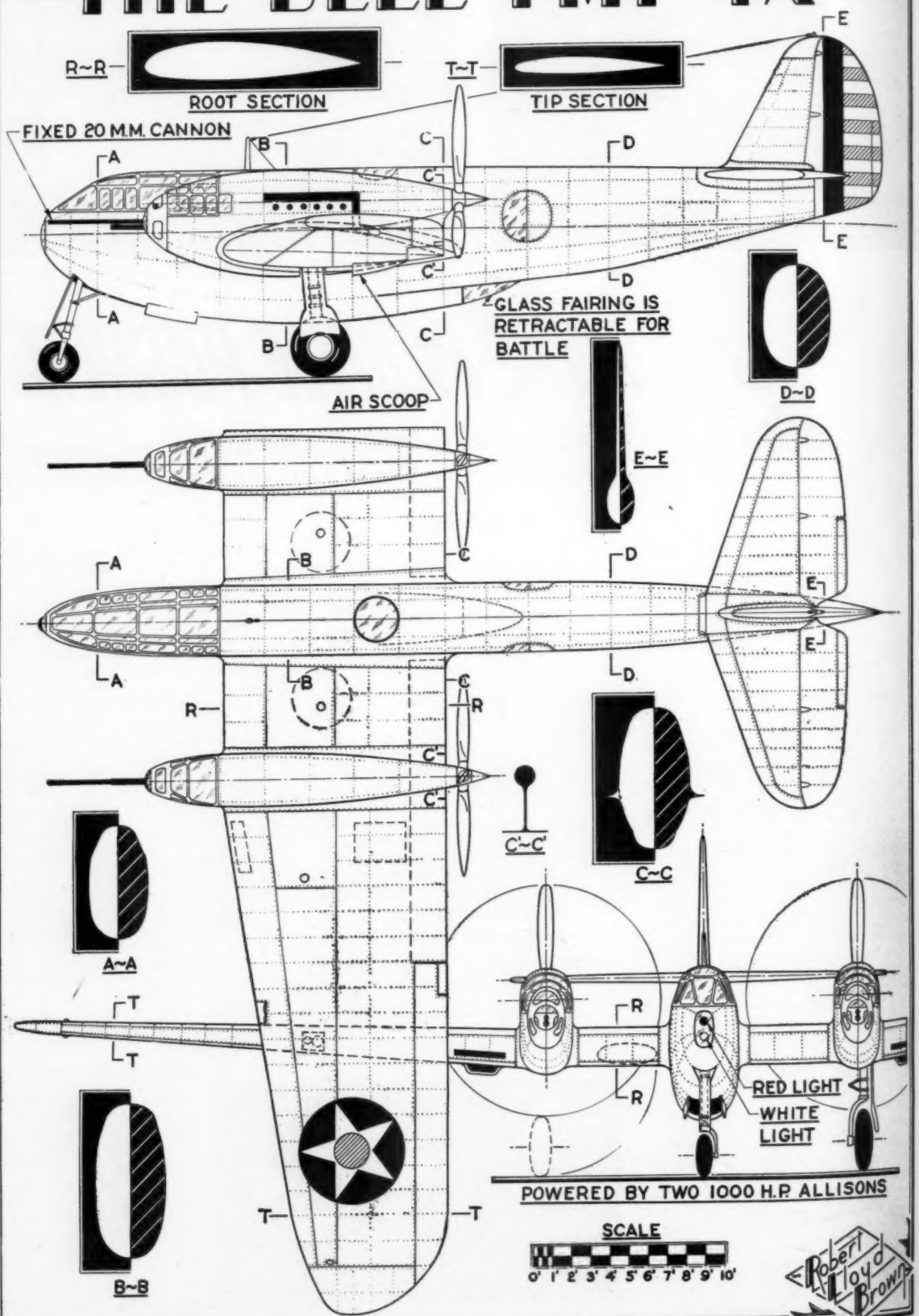
Landing Gear And Prop

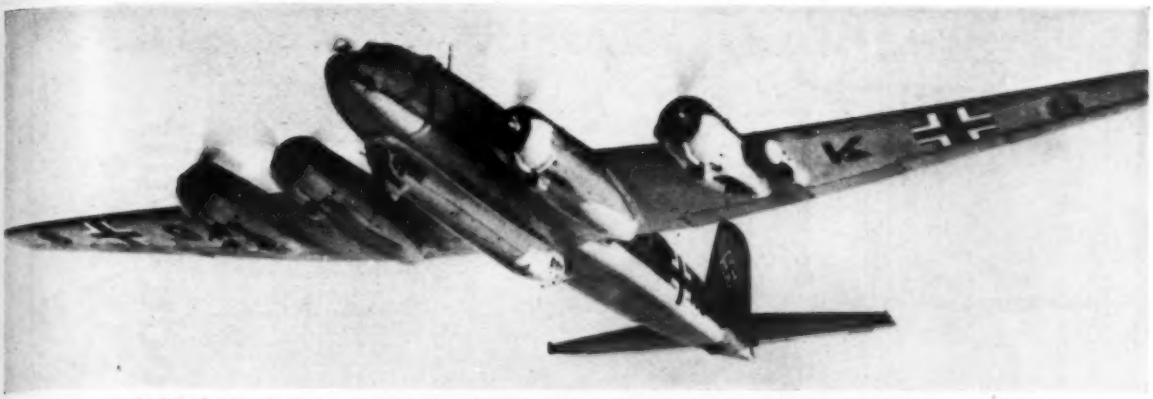
The landing gear is of tricycle design and is comparatively simple. The legs are made in two parts, cut from a piece of 1/16" sheet and later lined with No. 8 piano wire for strength. These are cemented to the under side of the landing gear.

The length of each leg is 2-1/4" and the distance between each wheel is 3-5/8".

(Continued on page 34)

THE BELL YMF-1A





Focke-Wulf "Courier," a new long-range bomber. Note the gun turrets and bomb cage on belly. (Acme)

FLASH-NEWS

Special To Model Airplane News:

ARMY AIR CORPS—The General Headquarters Air Force has moved from Langley Field, Hampton Roads, Virginia, home of the National Advisory Committee on Aeronautics, to Bolling Field, the huge Air Corps base at the nation's capital, Washington, D. C. The transfer will involve over two dozen transport, bombing and pursuit planes, four hundred officers and men and vast quantities of files, papers and records.

The air corps' giant experimental testing base, Wright Field, Dayton, home of the Materiel Division, is being enlarged by the acquisition of 740 additional acres bringing the total acreage of the giant base to 1,250, making it one of the largest in the entire world ! This additional area will be used for construction of a 9,000 foot runway to afford landing and take-off distance for the testing of the Brobdingnagian Douglas XB-19 Bomber, the biggest airplane ever constructed in the history of aviation!

This huge ship is a-readying at Santa Monica for its first test flight the middle of next month; this time for sure! Three weeks will be spent in taxiing and braking tests alone and the ship will not leave the ground until EVERYTHING has been checked and double-checked. After two weeks of flight test at the Douglas plant it will be flown to Wright Field. Air corps testing officers are already under training for flying this monster bomber, their course alone taking three months!

In the first month of this year the air corps received 1,002 airplanes! Thus we are already at the thousand-planes-a-month mark. Sixty percent of these were combat ships, the remaining 40% training ships.

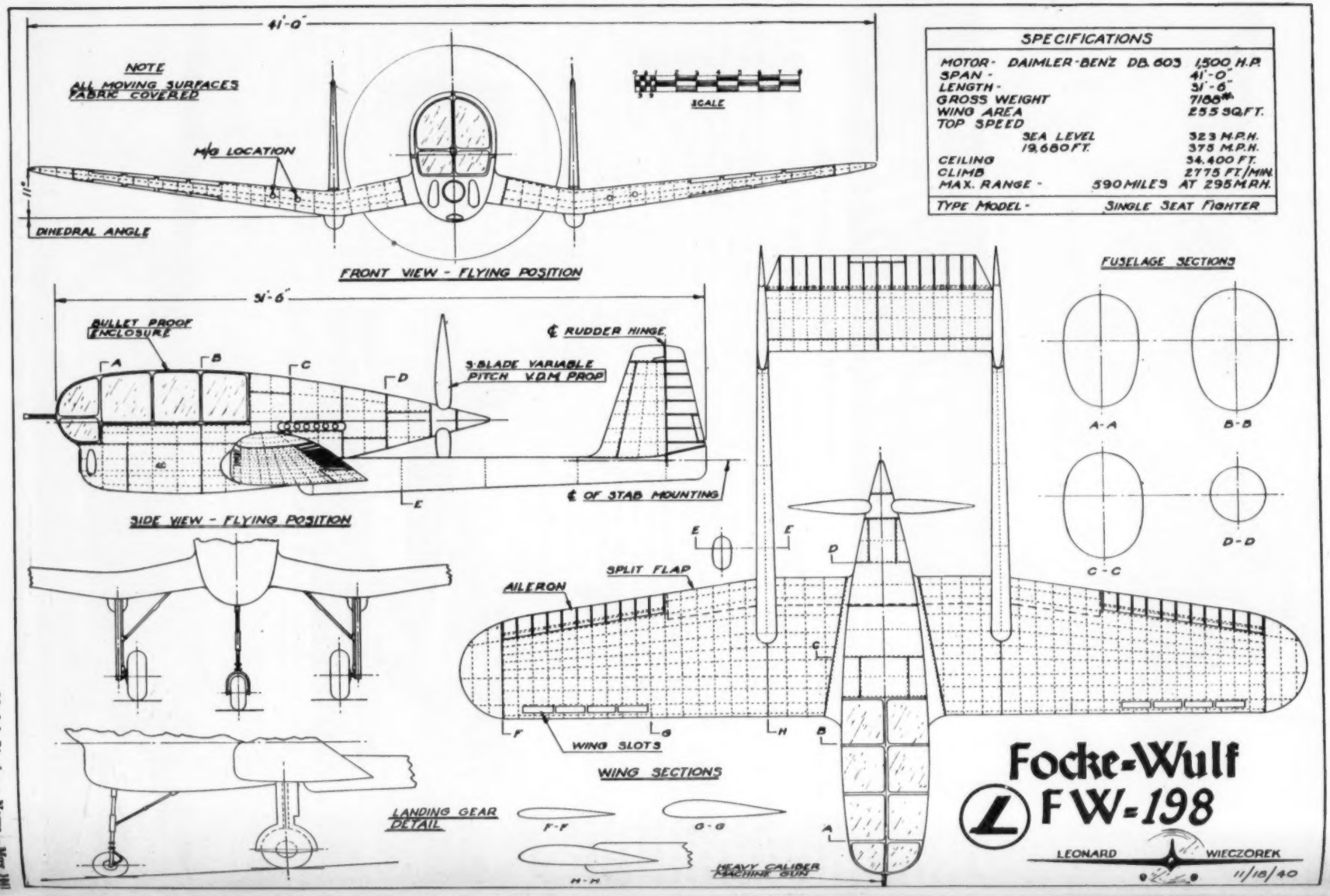
The air corps is now accepting delivery on the second Boeing B-17D, the first of which has been thoroughly tested at Wright Field including several long-distance sub-stratosphere flights. A total of 42 are on order. Upon completion of this number, production will begin on 512 Boeing B-17E's, a further improvement of the giant "flying fortress" type. This will mean FORTY SQUADRONS of this huge heavy bomber! This latest version will have cowl flaps, bullet-proof self-sealing fuel tanks, armour plating around the crew stations and three aerial cannon in gun implacements.

The third Boeing B-17 to crash in as many months took the life of Captain Richard S. Freeman, West Point graduate and veteran flyer who was personally decorated by President Roosevelt for his outstanding work as technical officer on the mass flight of six Boeings to Rio De Janeiro in 1939. Holder of the coveted Mackay Trophy, Captain Freeman was in command of the giant bomber which crashed and burned on a mountain-top in western Nevada, taking the lives of seven other members of the crew. The ship was loaded with the secret Norden Bomb-

(Continued on page 65)

A powerful Northrop seaplane patrol bomber for the Royal Norwegian Air Force operating with the R.A.F. Its speed is over 245 m.p.h. (International)

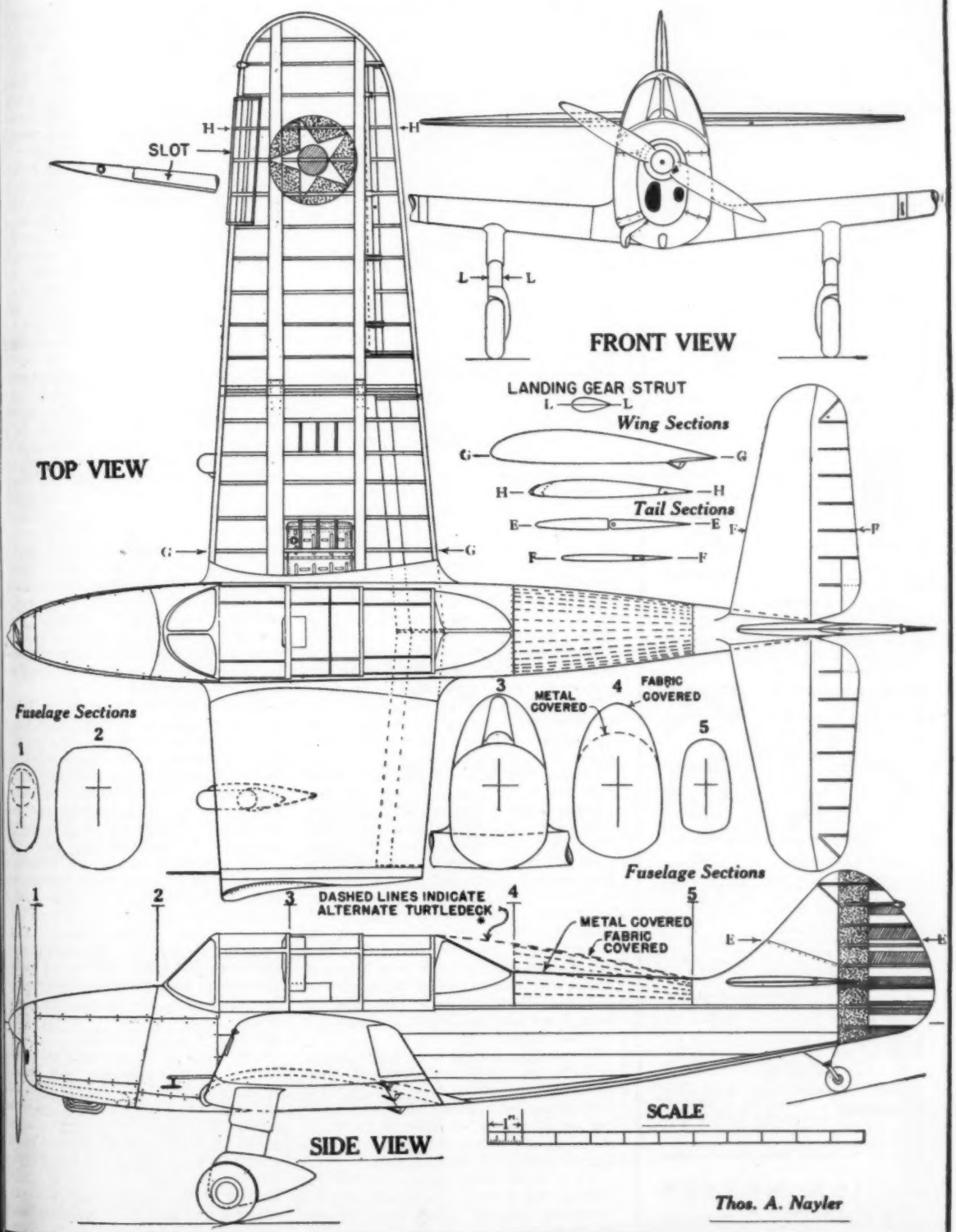
First of 26 bombers ordered from Consolidated Aircraft Corp. for the R.A.F. (Acme)



SPECIFICATIONS		
MOTOR - DAIMLER-BENZ DB 603		1500 H.P.
SPAN -		41'-0"
LENGTH -		31'-6"
GROSS WEIGHT		7188 LBS.
WING AREA		255 SQ.FT.
TOP SPEED		
	SEA LEVEL	323 M.P.H.
	19,680 FT.	375 M.P.H.
CEILING		34,400 FT.
CLIMB		2775 FT./MIN.
MAX. RANGE -	590 MILES	AT 295 M.P.H.
TYPE MODEL -	SINGLE SEAT FIGHTER	

U. S. ARMY PRIMARY TRAINER

FAIRCHILD M-62



Thos. A. Nayler

TOP HOLE
GAS MODEL ACCESSORIES

JUNIOR MOTORS PROPELLERS

No internal combustion engine, regardless of the number of cylinders, will run smoothly without a properly designed propeller. With this in mind, Junior Motors Corporation engineers have designed a propeller exactly suitable to miniature aircraft engines. They are presented here in three price ranges. We especially recommend the Deluxe Birch Propeller.

The following propellers are available in sizes from 8" to 14".

Please specify type when ordering.

JM Standard Gum Wood Propeller.....15c
JM Lacquered Gum Wood Propeller.....25c
JM Deluxe Birch Propeller.....35c

SPARK PLUG WRENCHES

Seamless steel tubing, finest obtainable. Punched with inside and **outside** dies. Cadmium plated to prevent rusting. Four sizes: Large for V Champion; Medium for Brown, Hurleman & Blue Crown; Small for V-2 and Extra Small for V-3. Medium size also fits propeller nut. Look for Junior Motors stamp on the product. Price only 20c.

CHAMPION SPARK PLUGS 65c

These famous plugs need no introduction and are used as standard equipment on Junior Motors. Three sizes: V, V-2, V-3.

COIL $1.75

J-M Spark Coil in shock-proof case, semi-closed magnetic core from Silicon transformer steel. Vacuum impregnated with wax of special die-electric strength.

CONDENSER 20c

200 Volts O.I.M.F.D. capacity. Light metal clad unit with combination mounting and ground connection.

BOOSTER BATTERY LEADS 30c

For connecting booster batteries to gas models. Two "U" clips for battery connections, and two Lucite plugs (Red and Black) for inserting into jacks on model.

EXHAUST MANIFOLD

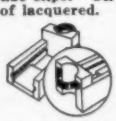
Easily attached to any Junior Motor, clip over exhaust ports. Keeps model free from oil, also excellent for cowling.

HIGH TENSION LEAD 15c

Finest stranded Belden Cord with high tension insulation and phosphorus bronze clips. Oil proof lacquered.

TEST BLOCK 35c

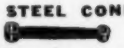
For running-in your motor, or for handy use when motor is not in model. Makes wiring and mounting simple, and protects motor from slipshod clamping. Special features include metal strap for mounting coil, grooves for wire leads. Complete with crankcase screws and wiring diagram. Inside width 1½", outside width 2¼".



FLYWHEELS $1.50

Machined from High Grade Alloy Steel, free from flaw or defects. Balanced and Cadmium plated to prevent rust. Weights: 7 oz., 11 oz., 14 oz., & 6½ oz. (Brownie)

STEEL CONNECTING ROD FOR MODEL D JUNIOR MOTORS $1.00



Drop forged one piece hy-grade special Alloy Steel.

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2545 N. Broad St., Philadelphia

Aviation Pages

(Continued from page 7)

have had here from the standpoint of his designing as well as his flying of model planes is now at Chanute Field in the Air Corps."

The accompanying photographs give an idea of the many and various modelplaners who are finding their careers in the aviation industry, and for additional proof we refer you to Kansas City, Mo., where a flourishing model airplane club carried on for several years under the banner of the Academy. Suddenly, the entire group dropped from sight, no word was received from anyone until Clarence Mooney, the N.A.A. representative in that territory, reported that the club had "folded up" because all the members had secured jobs in the aviation industry.

Such feats are not confined to the state of Kansas. Down around Clarksburg, W. Va. way, the W.P.A. is carrying on a remarkable model aviation program under the direction of A.M.A. State Contest Director Carl A. Hopkins, Jr. Hundreds of enthusiasts have been flying in meets and building and designing models under Mr. Hopkins' direction. Came government-sponsored ground-school courses, and when final exams rolled 'round it turned out—(you guessed it!)—that the aeromodelers walked away with top honors, including the flying courses presented to the best students. Not content with that, when Civil Service examinations were held for positions as Under Aircraft Makers at the Langley Field N.A.C.A. labs, more fellows were hired from the Clarksburg area than any other; in fact, almost as many came from West Virginia as from all the rest of the states in the 4th Civil Service District.

What does it prove? It demonstrates that model builders make the best aircraft technicians and aero industry workers. Why? Because they are intensely interested in aviation or they would never have become model airplane builders in the first place.

If their "job" is to put rivets in a wing, they are building an airplane, not just "driving rivets"; they think in terms of creating not merely performing an operation for a day's pay. This was clearly illustrated by a young man at one of the large aircraft plants. He had a simple task to perform: That of merely counting rivets (and he was a model builder!) As he went along the line, precisely and carefully counting each rivet of one of the wing ribs, he noticed that a few were loose and improperly inserted. Upon calling this to the foreman's attention, he was informed he was not hired to inspect airplanes but to count rivets.

However the matter came to the notice, in some way, of the executives—who immediately realized that here was not merely a laborer but a worker with understanding and experience. As a result, the young model builder was given a position of inspector with much higher pay.

To a model builder every part of the airplane has a deep significance; born of struggling through long hours of the night, creating and building his own flying "brain children." He has learned to think and put these thoughts into action and, unlike some workers, does not merely follow a dull and thoughtless routine of operation.

Yes, their model aviation work is splendid preparation for entrance in the full scale industry.

This is substantiated by enrollments at such flying schools as Parks which show a high percentage of ex- or active model builders among the student body.

In showing why model airplane flying fits one so well for employment in the aviation industry, Paul V. McNutt, Administrator, Federal Security Agency, recently summed it up rather well by saying "in choosing apprentices and young workers who may grow to take their places in industry, the vocational guidance counselors . . . look for youngsters who have shown interest in the field before. In selecting trainees and young workers, one looks with special attention to their hobbies. And when one finds a boy . . . testing and flying model airplanes . . . he can assume with some degree of probability that there is a boy who will make his way in the flight industry."

"Among these boys who go in for model building we find the likeliest prospects for apprenticeship training," Mr. McNutt continues. "The magic of the air is by no means making them all ambitious to be pilots. Many are taking the courses in our high schools and vocational schools. Many are building models and organizing clubs who seem to have no special desire to fly themselves. From the boys and girls of America now engaged in model building will come our mechanics and designers, dopers, skin fitters, angle benders, bumper hands, anodic operators, pattern makers and air line hostesses of the future. Those are only a few of the 500 kinds of jobs which the United States Employment Service is asked to fill in the aircraft and aircraft engine industries."

Those words of Administrator McNutt are encouraging to a model flyer hoping some day to be "earning his way" in aviation. Somehow, it seems incredible that two model airplanes changed the course of events in the lives of countless modelers—but that's exactly what happened, even though a great many persons, including Mr. McNutt, may not know it.

The present high interest in aviation among thousands of model builders can be traced back to early gas engine powered models. Before the advent of such craft, rubber powered model flying was an interesting if not too exhilarating sport. But when gas models hove on the horizon, the hobby spread like wildfire and rejuvenated even the indoor and outdoor rubber model categories by introducing new recruits to the activity.

One of the most important gas models, from an historic standpoint, was Maxwell Bassett's craft which "cleaned up" in several national meets; another equally as famed was the slow-but-steady K-G gas model, the first to really achieve international fame and a forerunner of many present-day ships. The design was by Charles H. Grant, editor of Model Airplane News and the original model was built and flown by Joseph Kovel, now employed by Brewster. *(Cont. page 34)*

MEGOW Models

THE HOBBIES THAT NEVER GROW OLD!

SHOWN ABOVE

J-11. CESSNA-34
A 30" span, de luxe flying model of striking beauty **50c**

D-9. RYAN ST.
50" span low wing flying model of Army trainer. **$1.50**

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Complete with motor, wheels, prop. and flight timer. **$14.95**

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New 1941 model with new type ignition, new crankshaft and counterbalance. New timer with non-wearing cam. ⅝" dia. ½ H.P. Wt. 3½ oz.

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German dive bombers D-13. 50" Flying Models **$1.00**
J-17—30" Flying Models . . . **50c**
S-44 small solid models. . . **10c**

One never tires of building Megow models. Boys of nine or ten start with the easier types, and as they become more expert soon start on flying models. Conquering that field, they begin building AERO-CHAMP or RANGER Gas Models that amaze all who see them perform. After that, if they do not get "drafted" by some big airplane company or similar industry, they will at least have skill that will be useful in a thousand ways.

No one ever outgrows Megow models. They step right along with progress in aviation, and reflect its latest achievements. New ones are always on the way. Boys and men of all ages are building Megow model airplanes, ships and railroads.

The big, new 132-page Megow catalog shows scores of airplanes, ships, model railroad equipment, parts, tools and supplies. Send 10c for your copy today!

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Exact scale, natural in appearance and detail. Flexible rubber roadbeds. Track sections and Trackside Equipment. Very extensive line.

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Used in Manchukuo, Spain, Poland—and by the British Army. Complete Construction Kit **25c**

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As licensed producer of "Air Youth of America" model kits, Megow offers five progressive types distinctly superior in quality and detail.

No. 1. Hand-launched glider . . . **10c**
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No. 3. Senior R.O.G. **25c**
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with 10c postage for catalog, or enclose with money order or check for ordering above items by mail.

☐ E-21 Aero-Champ
☐ "199" Motor
☐ J-11 Cessna
☐ D-9 Ryan ST.
☐ D-12 Spitfire
☐ D-13 Stuka
☐ D-11 Airacobra
☐ Air Youth No.____
☐ C-31 Spitfire
☐ J-17 Stuka
☐ Catalog

Include 15c post. for 37" or 50" models; 10c for smaller sizes.

Name_____

Address_____

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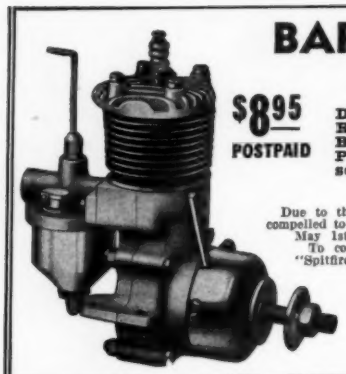

BARKER "Spitfire"

$8.95 POSTPAID

We're Flooded with Letters from Satisfied Users. —They're All "Raving" about Full-Powered Flights.

Displ. .69 - Wt. 10 oz. - H.P. ¼ plus R.P.M. 1000-7000 Recommended Prop. 14" to 16" Block Tested—Smith Coil, Condenser, Champion Plug and "Boy what a timer." One look will sell anyone.

IMPORTANT NOTICE

Due to the rising costs of quality materials and skilled labor, we are compelled to make an adjustment in our price from $8.95 to $11.95 effective May 1st.

To cooperate with model builders who have planned to purchase a "Spitfire" this spring, we will fill all orders received before May 1st at the old price of $8.95. Order your "Spitfire" today to assure early delivery as orders will be filled "first come, first served." Write for the newest circular.

Add 3% if delivery point is in Ohio

BARKER ENGINEERING CO.

BOX 3558 CLEVELAND HGTS., OHIO

So these, plus other early gas models, by doubling model aviation interest many times, resulted in today's hobby in which thousands of prospective aircraft industry employees find education, enjoyment, sport and tremendous satisfaction—the satisfaction that comes from designing, building and flying a craft operating under the same principles of flight that keep our planes of commerce and defense on wing.

Of course, not all model builders have to wait their turn to enter the ranks of aviation! Plenty are there already. Take the Glenn Martin plant at Baltimore, for example—if you were permitted to stroll through its shops and offices you'd find Alan Booton, Maxwell Bassett, Walt Coburn, Gordon Light, Bob Stevens, Larry Smithline and dozens of others. At the Piper Aircraft factory, Jack Thomas who made the American Wakefield team in '39, works alongside many another modeler. With Lockheed, one could find likeable Bob Wiehle, formerly of Washington, D.C., and Bob Shea and Ben Badenoch, from New England. With Consolidated is Elbert J. Weathers who heads up the model building hobbyists there.

Such a listing could go on indefinitely. But you don't need any convincing. Probably you, too, are acquainted with one or more modelers who have made good in a great big way in some American aviation plant. Your chance will come. In the meantime, it is good to know that you're engaged in a spare-time activity that is bound to reap dividends.

Model building is no longer considered child's play. It has become an "open sesame" to the aircraft factories of the nation!

How to Win the National Championship

(Continued from page 16)

microfilm jobs should never be taken along unless you have plenty of "mic" solution or patches with which to repair "damage in transit" or torn sections in the transparent covering caused by models drifting into walls and balconies. You probably know the lament coined years ago by 1933 indoor-Stout-event winner John Bartol—"Of all the sad cases, nothing can compare with finding that the microfilm on the wing frame isn't there!"

Even the best-prepared and most expert contestants competing for the first time in a national meet have been known to suffer from "weak-kneedness"—a symptom found in many champions the first time they face big-time competition. It's nothing to fear, we all have had to face the prospect of our "first" Nationals; the size of the meet, number of contestants and the pace of the competitive flying is enough to floor the most experienced flyer. Of course, it's plenty of fun, too, or we wouldn't all look forward to the "big battle" each year.

The main difficulty "first nationalers" experience is fumbling at the crucial moment—like letting the propeller slip off the winder during the last 20 turns, or forgetting to set the timer—beginner's mistakes that you think you've long since conquered.

So watch yourself all the time. Keep your models out of way of the thousands of spectators; don't roam off and leave your batteries laying on the field. Try and get a little sleep every night of the meet even if the rest of the gang want to sight-see the city from end to end.

Being a champion isn't so hard . . . It's perseverance that counts. And if you think you can do it, why, we'll be up there cheering when you step up for that big trophy emblematic of top-place position—the Detroit Exchange Club's National Meet Champ Trophy.

Good luck!

The Profile Pusher

(Continued from page 27)

The large wheels are of balsa, 5/8" in diameter. They are held on by a drop of cement on each axle tip; the piano wire is extended into the balsa as indicated on the drawing. This streamlined section should be very hard balsa to stand the strain of landings, and should also be covered two or three times with cement for lasting strength.

The prop can be bought at any model shop, or can be hand-carved. If the latter, use a block 1/2" x 7/8" x 5", medium-hard. As you know, this is a pusher and the prop should be cut to proper form; the photos plainly show the true form.

If one does not desire to carve a propeller by hand, a machine-carved one can be easily secured at any model shop. Since all these are right-handed propellers, the builder will have to carve it to be a left-handed one.

Assembly And Flying

Upon completion of every part, each section should be sanded down to proper form. After this is completed, the assembly starts. It is advisable to mount the main wing first. Of course this is not done until the two wing panels have been cemented together and diehedral added, which is 1-3/4" at each tip. It is advisable, incidentally, to use small objects under the extreme tips of the wings. These will hold the parts in position while drying. This is also done to the front wing, which has 7/8" at each tip.

After the wings are in position the rudders are added. The landing gear is next. The landing gear legs are glued in position, one on each side of the fuselage. No. 8 piano wire is used for this section, extended through the fuselage. After the main sections have been cemented in position the small parts are added. All this can be easily done by studying the drawing.

Before test-hopping the ship it is best to glide it over clear ground several times. By following this procedure you will be able to determine just which way the craft should be lined up for flight. If it has a tendency to stall a small amount of weight can be added, as indicated on the drawing.

Remember this is a pusher and everything seems to be turned around, but by following directions and the drawing, no difficulty should be encountered. Power consists of four strands of 1/8" flat brown rubber; this is sufficient to enable the model to climb very fast.

Now, if everything is all set and in perfect flying condition, take the model to a good, clear, open place and watch some real flights. You'll be surprised at the speed and very fast climb this little model has. If the model fails to take off, the

SEE M&M'S New 2⅝" Flyweight Gas Wheels ½ oz. PER PAIR PAIR PP. 75c

3" Balloon Wheels $1.00 PAIR PP.

NOW ON DISPLAY AT YOUR DEALER

Get That Extra Protection With M&M

All M & M Wheels can be inflated & deflated

Beware of Inferior Wheels built to look like M&M's

All sizes of M & M Wheels are the Lightest and Best Wheels Made

M & M Super Heavy Duty Wheel for Rubber Powered Models.

SIZES 1¼—1⅜—1½—1⅝"—PRICE $0.50 Per Pair, Postpaid.

SIZES 1⅞—2—2⅛—2¼—2⅜—2½—2⅝"—and Special Designed DoNut Wheels.

Size 1¾"—PRICE $0.60 PER PAIR, POSTPAID. For Air Mail Add 11c.

M & M'S ARE STANDARD EQUIPMENT IN ALL LEADING KITS

M & M's New 2⅝" WHEEL Designed for SMALL GAS MODELS ONLY $0.90. For Air Mail add 17c.

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3½" & 4½" Gas Wheels—Now only $2.75 per pair, postpaid.

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DEALERS—Our new discounts are very attractive. BUILDERS—Send for free illustrated literature.

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SAVINGS ON ALL SUPPLIES

SPECIAL!

Complete outfit—new Syncro B30 or Sky Chief motor—and your choice of any $2.95 kit, all for only **$9.90 P. P.**

18" BALSA STRIPS Select, Hard Stock

1/16 sq. 60.	5c
1/16x1/8 35 for	5c
1/16x3/16 18,	5c
1/16x1/4 15 for	5c
3/32 sq. 30,	5c
1/8 sq. 20 for	5c
1/4x3/16 12 for	5c
1/4x1/4 10 for	5c
3/16 sq. 8,	5c
1/4 sq. 6 for	5c
1/4x1/2 3 for	5c

18" Balsa Sheets

1/64x2 6 for	10c
1/32x2 9 for	10c
1/16x2 8 for	10c
3/32x2 7 for	10c
1/4x2 .....6 for	10c
3/16x2 3 for	8c
1/4x2 .....3 for	9c
1/4x2 .....2 for	11c

9" & 36" cost twice 18"; 3x36, 4 times

NOSE BLOCKS

1x2x1	1c
2x2x1	2c
2x2 1/4x1	3c
3x3x1	4c
3x3x2	7c
3x3x3	9c
5x5x2	17c

5 FOOT BALSA

Minimum 50c

1/8x3/16 10	20c
1/4x1/4 10	20c
3/16 sq. 8	20c
1/4 sq. 6	20c
1/4x1/2 3	20c
1/8 sq. 2	20c
1/8 sq. 2	20c

Sheets, 4 times 18". Double the above price for genuine aircraft SPRUCE

18" Balsa Planks

1/8x1/4.....2	for 5c
1x1.....1	for 5c
1x2.....1	for 9c
2x2.....1	for 16c
2x3.....1	for 22c
2x6.....1	for 48c
3x6.....1	for 72c

Plastic Balsa

4 oz. 23c, 1 oz. 10c

PROP. BLOCKS

1/2x 3/4x 5	7—5c
1/2x 3/4x 6	6—5c
5/8x 1x 8	3—5c
3/4x1 1/4x10	2—5c
3/4x1 1/4x12	3c ea.
1x1 1/2x12	5c ea.
1x1 1/4x15	6c ea.

Plywood—3/32

1/16, 1/8, 1/4 40c ft.

SKYWAY GAS MOTORS

No Premiums or Packing

Charges on Motors—P.P. 15c

Ohlsson "19"	$14.50
Ohlsson "23"	16.50
Ohlsson "60"	21.50
Forster $17.75 Ball Bearing	19.50
New Forster "29", Class B	16.75
"O.K." Special	15.50
"O.K." Twin, for radio con.	40.00
Dennymite $17.85 Unit	15.85
Brown D $12.50, Brownie	7.50
New Super Atom	15.50
New Bantam	16.50
Mighty Midget $9.50 Kit	7.85
Gwin	12.00
Tiger Aero	16.50
Syncro B-30 $7.95 PC-2 Kit	4.95
Sky Chief	6.95
Perky	10.95

Big Allowance for Old Motors!

CEMENT

CLEAR DOPE THINNER

Banana Oil

1 oz. 5c, 1/2 pt. 30c
2 oz. 9c, pint 50c

Colored Dope

1 oz. 6c, 2 oz. 11c
1/2 pt. 35c, pt. 60c

MICROFILM RUBBER LUBE

WOOD FILLER LIQUID CELLULOID

1 oz. 9c 2 oz. 15c

G. M. SILKSPAN

White, Red, Yellow, Orange, Blue 3 for 25c.—"OO" —3c per sheet.

Gas Model Silk

H'vy qual. 45c yd.

AA TISSUE

All col., doz. 19c
Silver, ea. 4c
Superstik, wh. 5c

Bamboo Paper

White 5c, 6 for 25c
Colors, 2 for 15c

Trexler Wheels

1¼. 1½—40c	
1¾. 2—50c	
2¼. 2½—60c	
Gas Mod. 2¾—$1	
3-1.25—3½-1.50	
4½-1.75	

M&M WHEELS

1¼. 1⅜. 1⅝-50c	
1¾. 2. 2⅜-60c	
Gas. Mod. 2⅝-90c	
Flyweight 75c	
New 3". $1.00	
3¼ 1.50, 3½ 2.75	
4½ 2.75—6" 4.00	

PROPELLERS

Balsa	Paulo	Ritz Wing	Gas Mod.
5"	4c- 7c		
6"	5c- 9c	8" 35c	
7"	6c-12c	9" 35c	
8"	7c-15c	10" 35c	
9"	8c-19c	11" 35c	
10"	9c-22c	12" 35c	
12"	10c-28c	13" 35c	
14"	12c-40c	14" 35c	
15"	15c-50c	15" X	
16"	16c-X	16" 35c	
18"	25c-X	18" 50c	

RITZ Gumwood

8"-9"-10"-11" 15c
12"-13"-14" 15c
15"-16" 25c
17"-18" 35c

GAS MODEL ACCESSORIES

Champion Spark Plugs 3/8 or 1/4 50c
Condensers—Metal, 13c Smith.....25c
Plugs & Jacks, Set of 2-35c val. 25c
Midget Tip Jacks 25c val. 2—15c
Terminal Clips 5/8" 10c val. 4— 5c
Gas Funnel, Alum. strainer.....25c
Spaghetti Tubing 1/16" 3 ft.—10c
Toggle Switch 50c val.....25c
"3 to 1" SAE 70 oil—1/2 pt.....25c
12" High Tension Leads—Best....14c
Booster Leads—50c Val.....35c
Masking tape—1/4x36-Instruc. card 5c
Alligator Clips—5c Solderless....10c
Xh'st Manifold—Keep Ship Clean
Nickel plated 50c. Streamlined $1.00
Spark Plug Wrenches—any size...20c
Neoprene tubing.....15c a ft.

VOIT WHEELS

3½ 1.50, 4½ 1.75
Race Car Set 6.00
Ball Bearing 8.00

COILS

Smith 3 V...$2.50
Competitor ...$1.75
Superlite ...$1.75
Powerhouse $1.50
Aero-Coil ...$2.25
Brown Jr. ...$1.75
U.S. Coil...$1.00

Wing & Tail Lts. (3 in a set) 5/16, 8c 9/16 10c 11/16 12c per set

TIMERS

Austin $1.00
Dural 1.97

ALUM. LEAF

3 sheets 5c

Bona Fide Dealers Write for WHOLESALE PRICE LIST

RUBBER-POWERED ACCESSORIES

Model Knife, Surgical Steel Blade 10c
Model Pins 1/2 or 1" 100 for..... 8c
Sheet Celluloid 5x7 3c, 14x17....15c
Ball Bearing Washer 10c value.... 9c
Sandpaper, 12 sheets 5x5.....10c
Lilliput Lights—for display model, 3 lamps, wired, instruction sheet. Per set.....80c
Insignia 36—American, French, English, German, Squadron, in colors, gummed, per sheet..... 8c
Washers, pinhole, 1/8, 1/4, 2 doz. 3c
Prop Shafts, doz sm. 6c, large....10c
Ball Bear; 1/16 15c ea., 1/8.....33c
Nose Plugs for 5c, 1/2"—8c, 3/4"—6c, 1" 4c.

MUSIC WIRE

.014 6 ft.	.2c
.020 .023 6 ft.	.3c
.034 .040 6 ft.	.6c
.049 .....6 ft.	.8c
1/16" .....3 ft.	.5c
3/32" .....5 ft.	.15c
1/8" .....5 ft.	.20c

ALUM. TUB'G per ft.	BRASS TUB'G per ft.
1/16 .....8c	.10c
3/32, 1/8 .10c	.15c
3/16, 1/4 .15c	.18c

Sheet Alum—ft.

.003 10c .010 15c

BROWN RUB'R

1/16 sq. 15 ft.	5c
1/8 flat 15 ft.	5c
3/16 flat 12 ft.	5c

Skein 225 ft.

1/16 56c, 1/8—80c, 3/16—85c

Camel H'r Brush

Med. 8c, Lge. 9c
Small 3c, Gas Mod. 15c

Thrust Bearings

1/2 doz. Sm. 5c
1/2 doz. Lge. 7c

Celluloid Radial ENGINES

1 1/2" 8c, 2" 12c
2 1/2" 14c, 3" 17c
4" 50c, 4 1/2" 65c

MACHINE GUNS

3/4" 2c, 1 1/4" 4c
1 1/2" Lewis.... 5c
1 3/4" Lewis.... 6c
1 1/4" Ring Mt. 10c
1 3/4" Ring Mt. 15c

FIRST TIME ANYWHERE!

Syncro - PC2

Motor Kit Complete!

with nationally known coil & condenser only! **$5.95**

Send 3c stamp for New 1941 Catalog.

FREE POSTAGE ON ALL U. S. A. ORDERS.

with all purchases over $1.00 your choice of: (1) Model Water Sprayer. (2) Model Builder's Knife. (3) Choice of 3-20" Model Plans—Curtiss, Heathe, Boeing, Briggs, Bellanca. (4) Masking Tape. (5) 6 sheets AA Tissue, (7) Sandpaper 12 sheets. Minimum order—50c.

SHIPPING INSTRUCTIONS: Packing cost on all orders 10c. 36" or 5 ft. 20c. To packing cost add 15% postage for U.S. possessions, Canada, foreign countries when order is over $1 and 15c if under $1. 5 ft. packages to Canada shipped Express Collect.

SKYWAY MODEL AIRCRAFT SUPPLY CO., 426 SIXTH AVE., DEPT. M, BROOKLYN, N. Y.

length of the front landing gear can be increased. This enables the small wing in front to have lift, facilitating the take-off. When hand-launching the model always launch it nose up! Good luck!

Bill Of Materials

One sheet of 3/32" by 2" by 18" for fuselage

One sheet of 3/64" by 2" by 18" for wings

One sheet of 1/32" by 2" by 18" for rudders

Two feet of No. 8 piano wire for prop shaft, landing gear, hooks, etc.

One prop block 1/2" by 7/8" by 5"

Three feet of 1/8" flat brown rubber

One ounce of glue

One hard-wood nose plug

Washers, pins, razor blade, sandpaper, pliers and other accessories

All wood is medium-hard balsa, except where otherwise specified.

The Physics of the Airplane

(*Continued from page 10*)

$$\text{Fahrenheit}^\circ = \frac{9}{5}(C^\circ \text{ plus } 32)$$

$$= \frac{9}{5} \text{ x } 125 \text{ plus } 32$$

= 225 plus 32 or 257° Fahrenheit.

When considering expansion, due to the heating of gases in aircraft internal combustion engines, the Absolute scale of temperature will be used. We learn from the kinetic theory of gases, a gas exerts pressure as long as its molecules are in motion. The temperature at which the molecules cease to exert a pressure, is, then, the temperature at which these molecules cease to move. This temperature is known as the absolute zero point and is found to be 273 degrees below zero degrees Centrigade. No gas will exert a pressure at or below that temperature. See Fig. 3.

An example to convert Centigrade to Absolute follows:

The reading on a Centigrade thermometer is 57 degrees. What is the Absolute temperature?

Absolute temperature = °C plus 273°
= 57° plus 273 = 330° Absolute.

The vapor pressure type of temperature gauge probably finds greater use in the field of aeronautics than the liquid type, described previously. This type of instrument consists of a temperature gauge whose bulb is immersed in the oil or liquid to be tested. A capillary tube connects the gauge with the bulb which is partially filled with a highly volatile liquid, methyl-chloride generally, although it is possible to use sulphur-dioxide, methyl-ether and ammonia. Upon being subjected to high temperatures, the capillary tube becomes filled with vapor of the volatile liquid. The temperature gauge consists of a "Bourdon Tube" comprising a spring tempered brass or bronze tube, elliptical in cross section and sealed at one end. This tube possesses the tendency to straighten when pressure is applied internally, and to return to its original position when the pressure is released. The Bourdon Tube in this instance is subjected to the vapor pressure within the capillary tube and this is proportional to the temperature of the liquid in the bulb. Therefore changes in temperature cause bending or straightening of the Bourdon tube and by a means of a mechanical linkage this movement is transmitted into angular motion of an in-

BLUE CROWN 65c

Especially designed for

HIGH SPEED ENGINES

BLUE CROWN SPARK PLUGS

DO NOT BLOW OUT.

AN EXTRA GASKET WITH EACH PLUG.

Please Order From Your Dealer

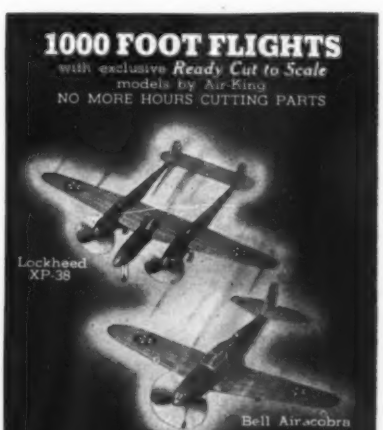
A-1-⅜-24
A-2-½-32

J. E. MENAUGH COMPANY, CHICAGO

1000 FOOT FLIGHTS

with exclusive *Ready Cut to Scale* models by Air-King

NO MORE HOURS CUTTING PARTS



Nothing else like these new Air-King kits. Parts ready-cut from A-1 balsa, propellers ready made. Enables stronger construction — longer flights than ever before possible. Speed of 42 m.p.h. made with Bell Airacobra, rubber band powered Wingspans 34". CURTISS P42 another ready-cut kit.

Nothing extra needed for building, and each kit **only $1.00 complete.** By mail postage 15c extra. Catalogue 3c stamp.

AIR-KING MODELS, Inc. 5204 S.E. Foster Portland, Ore.

Here It Is! The FLAG/SHIP

Scientific's **ALL AMERICAN**

What more conclusive proof could you give to show your pride in being an American, than by flying the "All American" with its dashing red, white and blue color scheme. Besides being beautiful, it will give you many hours of real flying thrills. Wingspan—45". Complete kit, postpaid or at your dealer..... **$1.00**

Scientific's
DOUBLE DUTY KNIFE 10¢

PAT. PENDING

SCIENTIFIC
DOUBLE Cutting Edge

BLADE GUARD

Double Edge Blades
Package of 3 10c

Get your copy of Scientific's 1941
CATALOG
Send **5c**

NEW No. 1 *Scientific*
GLIDER

NEW! Wing tapered! Rudder, stabilizer and fuselage cut to shape!

They're selling as fast as we can produce them! And no wonder—for it's the most beautiful glider on the market . . . and when you fly it—Boy!—no use talkin', words couldn't describe flights such as this! Take another look at those new features mentioned above. Is it any wonder that it's so popular? Wingspan—20⅝". Length—18". Complete kit, postpaid or at your dealer..... **25c**

Scientific's
CLARION

A scale type model, designed primarily for flying. Wing is stationary and faired into the fuselage. And look at that slick looking cockpit! Movable tabs on tail surfaces insure easy directional control. Wings yellow; stabilizer blue and black; fuselage and rudder blue. Wingspan—30". Length—23¾". Complete kit, postpaid or at your dealer..... **50c**

Another popular m... Squadron." This s... sistent and steady ... ground within three ... open cockpit. Wing ... white with red tri... Complete kit, postpaid ...

SCIENTIFIC MODEL AIRP... C...

"GAS MODEL HEADQUARTERS"

218-220 MA-5 MARKET ST., NEW ... J...

...by Scientific!

...GSHIP" is ... a gas model builder's dream for a class "C" gas model that ... "TOPS" ... performance, yet inexpensive too! It's sound aeronautical ... incorporating ... outstanding engineering features, gives it the climb of a ... the glide ... unequalled for stability and performance, the "FLAGSHIP" ful... requirements ... model builder, and is eligible for A.M.A. contest rules. Among ... atures are ... motor and ignition mount, specially constructed for easy mount... unmounting ... tery box adjustable for weight and balance.

KIT includes ... plans, finished propeller, 3½" balsa wheels, Scientific ce... boo paper ... white and blue bamboo paper, finished fastener for mount... ing landing gear, all hardware and fitting required, balsa strips and printed balsa sheet, and all other materials necessary—postpaid or at your dealer . . .

$4.95

- ★ Wingspan—78"
- ★ Overall Length—44½"
- ★ Wing Area—850 sq. in.
- ★ Total Weight Complete with Motor—3 lbs.

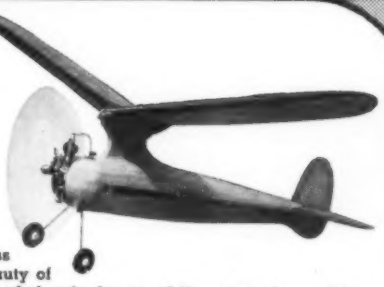
Scientific's

STARLING

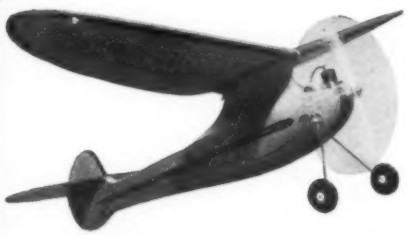
Complete Kit

$1.95

Postpaid
or at your dealer



Classiest of the class "A's", the lines and beauty of the "Starling" are exceeded only by its ability to perform. The wing ribs, tail parts, fuselage sides, and bulkheads are all die cut, assuring you exactness of fit and ease of construction. The entire motor hook-up and landing gear are attached as one unit with a movable battery case for balance adjustment. Many other new, unusual features, too. Wingspan—40". Length—27¼". Wing Area—210 sq. in.



Scientific's

ENSIGN

Complete Kit

$2.95

Postpaid
or at your dealer

By consistently winning contests and establishing new records, the "Ensign" has proven itself as the best in Class "B". Features include: Motor mount especially constructed to allow for easy mounting and unmounting of power unit; movable battery box, for weight and balance adjustment; finished landing gear; finished landing gear clamp (a new Scientific feature). Wingspan—50". Length—34¼". Wing Area—372 sq. in.

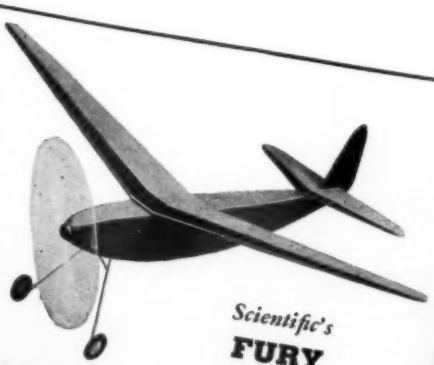
Scientific's

...EDSTER

...Flying Demon ... model in a con... off from the ... wing type, with ... red; fuselage ...

...postpaid ...

...ler **25c**



Scientific's

FURY

One of the most popular members of Scientific's "Flying Demon Squadron," the FURY is exceptionally easy to build. It's a real flyer, too. Wing and stabilizer light blue with red trim; body and rudder all red. Wingspan—25". Complete kit, postpaid or at your dealer..... **25c**

Scientific's

PARACHUTE PLANE

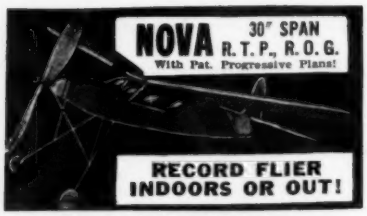
. . . with automatic trap door release!

What a thrill you will get when you see the pilot drop out with his parachute! . . . and it's all done automatically! Besides, it's a trim endurance model that will easily make flights of a mile or more. Easy to build, too, even for a beginner. Wing span—40". Complete kit, postpaid or at your dealer **$1.50**

...IRPL... CO.

...RTERS

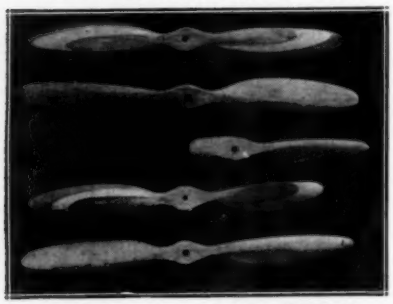
...NEW... N. J.



**Over 3 minutes in the open—
2½ minutes "'Round the Pole"**

Kit includes Clark "Y" ribs completely finished and notched. 10" "proper-pitch" Helical type prop. and finished wheels. Free wheeling prop attachment and shaft. Celluloid, round bamboo, celluloid tubing, steel wire, assorted balsa, cement, dope and brush..... **75c**

DeLuxe NOVA with silk for wings and fuselage $1.00 (West of Mississippi, add 12c)



A NEW **AIR LINE** The SOMETHING NEW IN PROPS! **PROPS WITH THE PROPER "AIR-BITE"**

REGULAR 8" 9" 10" 11" **20c** 12" 13" & 14" **25c**

Right Hand, Pusher Type 5c Extra

Single Blade 4", 4½", 5", 5½" 35c

Laminated Hi-Gloss Finish 9", 10", 11", 12", 13", 14" 50c

3 Blade AtMos "Tripple" 8", 9", 10", 11", 12" Ea. $1

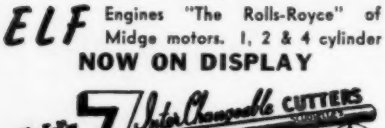
THE ONLY COIL UNCONDITIONALLY GUARANTEED

"A" "B" "C" For Planes, Boats, Race Cars

$1.00 Lightning fast start, unfaltering performance up to 20,000 R.P.M. Crash proof case, hermetically sealed against gas and oil seepage. HOLDTITE hi-tension terminal. Comp. with double snap-on lead.

"SPARKIE" **METAL-COVERED CONDENSER** **25¢** Delivers perfect spark under all conditions. For "C" engines! SPARKIE is tops for racers!

ELF Engines "The Rolls-Royce" of Midge motors. 1, 2 & 4 cylinder **NOW ON DISPLAY**



The ONLY Tool Set Especially Designed For Modellers! **50¢**

7 Easily sharpened, rust-resistant, speedily changeable cutters! Ideal for Balsa and similar surfaces. Hand ground and sharpened. Angle: Tongue and Groove; Dovetail; Inlay; Webbing; Notching; Streamlining; Rounding; Ovaling; T-H-L-V. (Additional blades only 3 for 25c.) All packed in attractive, simulated wood box.

48 PAGE ILLUSTRATED BOOK

Planes, Engines, Boats, Trains, Race Cars. 10c (coin or stamps) Contains 10c cash value coupon! Over 600 items, valuable data and charts.

INTERNATIONAL **MODEL PRODUCTS** 254 W. 55th Street, (Dept. MB) New York

dicating hand or pointer. The vapor type of temperature indicator assists greatly in operating an aircraft engine at maximum performance efficiency because it indicates overheating or overcooling so that necessary correcting adjustments can be made before damage occurs.

Temperature of the atmosphere is a very important condition that concerns meteorology and now recording instruments at weather stations and on airliners permit atmospheric recordings to be made. Air temperature effects icing conditions and this is important to a pilot in aerial navigation. Also air temperature readings guide the glider pilot in his search for rising thermals or descending currents.

Air Youth of America

(Continued from page 19)

nounces that sixteen states have already requested and been granted Air Youth Medals for contests this spring and summer. Indications are that for the first time, the Air Youth event will be held in a number of state contests this year plus those in which it was held last year.

States which have already signed up for the Air Youth event are:

Contest Chairman

State

Iowa—W. B. Wright, Des Moines
Louisiana—Whalen J. Norman, New Orleans
Michigan—Stephen Corbett, Detroit
Missouri—R. H. Sommers, St. Louis
Nebraska—L. B. Bush, Omaha
New Jersey—Frank M. Krysiak, Linden
New York—Harry C. Copeland, Syracuse
North Dakota—A. W. Larson, Walcott
Oklahoma—Raymond Bean, Oklahoma City
Pennsylvania—Harry G. Vogler, Jr., Pittsburgh
Rhode Island—Emile L. Dubuc, Pawtucket
Tennessee—Hugh Powers, Knoxville
Texas—E. F. Burgdorf
Virginia—Rutledge Fuller, Norfolk
Washington—H. T. Weeks, Seattle
West Virginia—Carl A. Hopkins, Clarksburg
Wisconsin—Howard W. Carlson, Milwaukee.

Air Youth Scholarships

Announcement of winners of the Air Youth Scholarships will be made early this month. The board of judges are now going over the applications and the report is that boys who entered the contest were of an unusually high caliber. Of the thousands who applied, more than 200 met the high qualifications set, and the records of these boys are now being examined by the judges. Outstanding high school records and notable accomplishments in model airplane building were characteristic of the boys. All the boys were high school seniors, or graduated within the past two years; a number of them have already earned their pilot's license, under the CTPT, or on their own, and several of them are employed by airlines or aircraft manufacturers but wish to improve their standing by qualifying for the advanced training offered by the Air Youth Scholarships. Winners of the scholarships will be announced in MODEL AIRPLANE NEWS soon.

Rearwin Speedster Nationals Winner

(Continued from page 13)

traced on the block and cut to size. When this is done, the outline of the side of the fuselage is next traced and the block cut to shape. The block now has the proper top and side outlines but the cross section is rectangular.

The next step is round the edges with a knife and sandpaper to finished form. The fuselage is roughly carved with a knife, then some very coarse sandpaper used to obtain its accurate form. It is finally finished down with fine sandpaper to a very smooth surface. The templates provided in Plate 2 should be used intermittently as carving and sandpapering progresses to insure proper cross sections. When the fuselage has been sanded down, two coats of dope are applied to harden the surface. Before continuing with the carving of the fuselage a 3/16" hole is drilled at the rear, where the tail plug which holds the rubber is inserted.

The next step is to hollow the fuselage. A piece of string pulled between the glued halves will break it apart. Using a gouge, the two halves are hollowed out until the walls are about 3/16" thick in front and 3/32" thick in the rear. Rough sandpaper is then employed until the walls are about 1/8" thick in front and 1/16" thick in the rear. The walls are left thick in front because strength is required around the landing gear and nose; another reason is to help obtain balance.

While sanding the fuselage the thick spots can be found by holding the shell to the light. Finally, fine sandpaper is used to finish the inside and two thin coats of dope are applied to harden the inside surface. Before gluing the halves together again, an opening for insertion of rubber is cut out and aluminum plates glued to the interior, where the tail plug goes through the fuselage. This is absolutely necessary because the wood will not take the bearing load of the tail plug due to tension of the fully-wound rubber motor.

Also a former is cut from 1/16" sheet balsa to fit on the interior of the fuselage at section D-D. It is made in halves so that each half will fit its respective side. A hole about 1" square is cut in the former so that the rubber can pass through it. When the aluminum plates and former-halves have dried in place, the fuselage halves are given a coat of glue along the seam and fitted together. Care should be taken to be sure the seam is glued all along top and bottom.

A piece of rubber band is then wrapped around the fuselage, along the entire length, to force the halves together to form a good joint. When it has dried completely the rubber band is removed and joint sanded; if glued properly the joint will be barely visible. Next the front of the fuselage is sanded smooth and piece K is cut from 1/8" sheet and glued on securely. The wood from which

20 Seconds to Go!

You're out in the starting pit. Several thousand people are lined up behind the barrier. Your timers walk over and shift from foot to foot, waiting for you to start. As you bend down, some gravel blows up in your face, your hands fumble around the prop, and you know that in a few seconds you're going to be completely sunk—or—

—Oh say, *look at that climb.* ("There goes an Ohlsson," the announcer calls over the loudspeaker, "LISTEN to that motor!") *Say, you've got a chance, a real chance—now if she'll just hang on to that thermal—*

20 seconds to go. That's all, and that's when you'll be glad you have a 1941 Ohlsson! Quietly but steadily, precision has been even further increased. Stronger parts have been substituted for the best we could find before. New machines have been developed to accomplish accuracy that we have been *dreaming* about for four years. The result is a finer, more efficient, more powerful motor with wearing qualities that are going to surprise you—in each class.

See them at your dealer's—and send for the folder which describes Ohlsson & Rice complete "Precision Control" production of every part (exc. spark plugs).

OHLSSON & RICE
MANUFACTURING COMPANY
"Paced to AVIATION'S *Progress"*

Member

BE A 3-WAY CHAMPION WITH 3 OHLSSONS

★ **Class A—$14.50** ★ **Class B—$16.50**
★ **Class C (Custom) $21.50**

Ohlsson & Rice Mfg. Co.
P. O. Box 2324, Terminal Annex
Los Angeles, California

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piece K is made should be rather hard.

Referring to the detail of the wheel pants the proper thicknesses of balsa are cut to the proper outline, then cemented together. After the glue has dried the corners are carved away and the pants sanded to a streamlined shape.

The next parts to be made are the streamlined landing gear struts. They are of medium wood to the dimensions indicated and a 1/16" groove is cut in where the 1/16" wire is to go. The landing gear wire is next formed to shape indicated on the plans. The various parts of the landing gear are then assembled on the landing gear wire (don't forget the wheels). After the assembly has dried securely a notch is cut in the fuselage and the landing gear properly fitted to it. The landing gear is then glued, making sure plenty of glue is applied around the wire and inside of the fuselage. When the landing gear is dried, plastic wood is placed at all the joints to form the fillets. The final step in the construction of the fuselage is to build up the frame work around the windows. The best way to do this is construct two sides of the shaded portion on the drawing, glue them on to the fuselage and finally put in the 1/8" square cross members.

Wing

The wing is constructed in the usual manner. Eighteen W-1 ribs, two W-2 ribs and two W-3 ribs are cut from medium 1/16" sheet balsa. A piece of balsa measuring 3/16" x 1/2" x 35" is cut from medium balsa; this is the spar of the wing. The trailing edge is 1/8" x 15/32" x 33", cut to a triangular cross-section, and the leading edge is 1/8" square balsa. The first step is to cut the main spar at the points where the two center ribs are located and put in the proper amount of dihedral. Next the ribs are slipped on the spar and spaced the proper distances.

From this point the work is done separately on each half of the wing. The trailing edge is pinned in place on the plans, the ribs and spar placed in position, and the leading edge set in the notches cut in the ribs. After everything has been aligned properly each joint at the leading edge, trailing edge, and spar is coated with glue. The tips are next glued in place and shaped to the proper form.

The final step is to glue the thin sheet balsa in place along the leading edge. The plan form for the other half of the wing is obtained by turning over the original plan form and rubbing the entire surface with a small amount of lard.

Tail Assembly

Before starting the horizontal tail a drawing of the complete surface is made; this is necessary because the surface is constructed as one piece. The procedure is the same as that employed in the construction of the wing. The trailing edge and tips are cut from 1/16" balsa and the leading edge from 1/8" balsa. It will be noted that the leading and two spars taper in thickness along the span of the horizontal tail, so refer to the drawings of the ribs for the thickness along the span. The rudder is made in the same manner. The elevators are attached to the stabilizer and rudder to the fin with the use of small squares of thin sheet aluminum. When building the tail surfaces remember to keep them as light as is practicable.

Covering

Before doing any covering take a block of wood with a piece of sandpaper wrapped around it and sand off any irregularities on the surfaces; this step is vitally necessary if a good covering job is to be obtained. After each part has been sandpapered properly the model is ready for covering.

The type of paper used in covering the wing and tail surfaces on the original model is known as superfine tissue. The reason for its use is that the paper presents a much smoother surface for painting and consequently provides for a better finish. All the surfaces are covered with the grain of the paper running spanwise. When covering the wing cover the bottom surface first, and when covering the tips use more than one piece of paper in order to insure a smoothly-covered surface. When applying the paper, dope is put only on the leading and trailing edges and the outer edges covered by the paper. The wing piece is shrunk by spraying it with water, but do not shrink the tail surfaces in this manner. To be sure that they do not warp, steam them just enough to remove any wrinkles.

Assembly

The wing and tail surfaces are now fixed to the fuselage. The first step is to cut out the notch in the rear of the fuselage and properly fit the horizontal surface. Care should be taken to see that each tip of the surface is the same distance from the ground. The next surface to be put in place is the vertical tail. This particular surface is merely glued onto the top of the fuselage and an aluminum hinge put between the fuselage and rudder. Be sure that the vertical tail is perpendicular to the horizontal tail surface. The wing is next fitted to the fuselage, care being taken to have each tip the same distance above the ground. The tail wheel is next made and a wire fork bent to shape. The wire is then pressed into the fuselage and glued in place. The celluloid windows are glued in place and the windshield is fitted around the wing and fuselage and glued.

Propeller and Nose-Block

The importance of having a good propeller cannot be over-emphasized: It should be perfectly balanced, have the same pitch in both blades, have cambered surfaces, and fold back properly against the fuselage in the glide.

The propeller is made from a block of medium balsa measuring 7/8" x 1-1/2" x 10-1/2". The first step is to carve the block to the shape shown in the plans. Then, before proceeding, the small round piece of balsa is glued to the front of the hub as shown. A right-hand propeller was used on the original model. The concave side of the propeller is carved first; the camber should be about 5/32" deep.

After the concave side of each blade is

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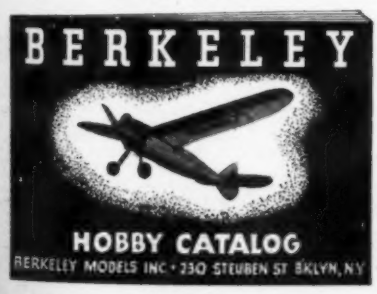

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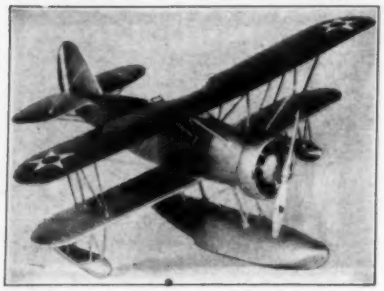

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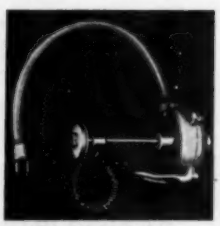

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carved and sandpapered, the convex side is carved and sanded to shape. The tips are then rounded properly and the hub carved into a spinner which fits in with the contour of the fuselage. The hinges for the folding propeller are next made, glued in place and wrapped with thread. When the hinges have dried in place the blades are cut at the hinge points. The nose-block is next carved from a block of hard balsa to the shape indicated; then a piece of 1/4" balsa cut to fit the opening in the front of the fuselage and glued securely on the back of the nose-block. A hole is drilled through the nose-block and a brass bushing inserted.

The wire shaft and spring are next bent to shape and the aluminum plate fitting between the spring and bearing is cut to shape. The parts are then assembled and the front part of the wire shaft is bent into a loop and fitted into the spinner. The final step in making the nose-block and propeller is to insert a small screw to act as a catch to stop the propeller in the proper position.

Painting and Miscellaneous Details

The airplane is now completely constructed with the exception of the wing struts and the thread bracing at the tail. The struts may now be constructed in the usual manner but they are not put on the model just yet; the model should be painted first. The windows are first masked off, then one thin coat of clear dope and two coats of red dope are applied over the entire model except the propeller. The numerals and strips are next masked off and two coats of yellow paint are applied. Also at this time the propeller is painted with two coats of clear dope and two coats of silver dope. Struts are painted in the same manner but with red dope. The final step in the construction is to glue the struts in place and remove the masking tape from the windows and fuselage.

Flying

The power employed in the original model was ten strands of 3/16" flat, brown rubber about 26" long. The rubber is next lubricated with a four-to-one mixture of liquid green soap and glycerine and inserted in the fuselage. Enough winds are then put in so that there is no slack, and the point of balance determined. It most probably will be tail-heavy so the nose-block is hollowed out slightly and the required amount solder necessary to balance the model (about one-third the chord from the leading edge) is put in.

The model is now ready to take out to the field. Before actually flying it, it is glided several times until a long smooth glide is obtained. This model, in spite of its weight, should glide just as well as any outdoor cabin model but a little faster.

Next a small amount of side-thrust is put in and the rudder set left-neutral. About one hundred winds are put in and the various flight tendencies noted. If the model stalls under power put in a small amount of down-thrust. Be very careful not to give the model too much rudder either way because it is very effective due to the small amount of dihedral. The original model was adjusted to fly in very large, left circles under power and glide in smaller circles to the right. The maximum winds for this model are about eight hundred. Happy landings!

Academy of Model Aeronautics

(Continued from page 16)

section of a fuselage shall not be considered built-up.

CABIN MODEL, NON-POWERED. A non-powered model of the cabin type (towline glider) must have a total maximum cross-section area of the fuselage(s) of not less than $L^2/200$, where "L" equals the over-all length of the model. The fuselage shall be of streamline form and have not less than 90 percent of its surface area covered. Outriggers and booms may be used.

HAND-LAUNCHED. A model airplane is hand-launched when it is released into flight directly from the hands of the launcher. The model shall be launched from an elevation of not more than 6 feet above the ground or floor.

RISE-OFF-GROUND. A model airplane of the rise-off-ground (R.O.G.) type has a take-off gear that permits it to take off from the ground, floor, or runway, starting from a standstill under its own power. R.O.G. models shall be held before release by pressing downward on the wing and/or fuselage and lifting the hand vertically upward for release; or by holding the wing, stabilizer or rudder between the thumb and index finger and opening the fingers for release without any forward motion of the hand at any time. The take-off gear must be strong enough to support the model in a normal attitude while at rest and permit it to take off unassisted without damage, nosing over, or striking a wing tip. When one wheel is used, skids or similar devices shall be required to keep the model upright in a normal attitude and to prevent any part other than the take-off gear from touching the ground, floor or runway. Wheel(s) shall turn freely and be of such strength and size as to permit the model to taxi freely. The minimum diameter of the wheel(s) for all models powered by other than internal combustion engine(s) is as follows: one-half inch, where the projected area of the supporting surface(s) does not exceed 30 square inches; three-quarters inch, where the projected area of the supporting surface(s) exceeds 30 but is not more than 100 square inches; 1 inch, where the projected area of the supporting surface(s) exceeds 100 but is not more than 150 square inches; 1½ inches, where the projected area of the supporting surface(s) exceeds 150 but is not more than 300 square inches; and 2 inches, where the projected area of the supporting surface(s) exceeds 300 square inches.

TOWLINE-LAUNCHED. A model airplane is towline-launched when it is pulled into the air from the ground by an inextensible line. The towline shall be no longer than 100 feet and shall be released from the model by the launcher. To assist in determining the time of release, a fabric or paper streamer shall be affixed to the towline not more than 12 inches from the end which is attached to the model.

RISE-OFF-WATER. A model airplane of the rise-off-water (R.O.W.) type can take off from and alight on water and shall float unassisted. All surfaces and parts other than floats or pontoons shall be above the surface of the water. The model shall take off from the water starting from a standstill under its own power, but is not required to land on the water at the end of the flight. Indoor rise-off-water models shall demonstrate their seaworthiness by floating five seconds. Outdoor rise-off-water models shall demonstrate their seaworthiness by floating thirty seconds.

AUTOGIRO. An autogiro model is supported in flight by the action of the air on vanes which rotate freely on an approximately vertical axis, supplemented by the thrust of propeller(s) on an approximately horizontal axis. If a fixed wing is employed, the projected area of the vanes shall not be less than that of the fixed wing(s), and the sums of these projected areas shall be considered the main supporting surface(s).

ORNITHOPTER. An ornithopter model derives its lift and propulsion solely from the flapping of its wing(s). The projected area of the wing(s) shall be taken midway between the upward and downward positions of the wing(s).

HELICOPTER. A helicopter model rises without assistance and is supported in flight solely by the lift of power-driven propeller(s) and/or vane(s). The projected area of the propeller(s) and vane(s) shall be considered the supporting surface(s).

GLIDER. A glider is similar to a model airplane but differs in that it has no power plant.

Classification

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classified by engine(s) displacement as follows: Class A, where the displacement of the engine(s) does not exceed .20 cubic inches; Class B, where the displacement of the engine(s) exceeds .20 but is not more than .30 cubic inches; and Class C, where the displacement of the engine(s) exceeds .30 but is not more than 1.25 cubic inches. Models powered by internal combustion engine(s) shall employ a device to limit the length of the engine run.

MODEL AIRCRAFT OTHER THAN THOSE POWERED BY INTERNAL COMBUSTION ENGINE(S). All models other than those powered by internal combustion engine(s) are classified by projected area of the supporting surface(s) as follows: Class A, where the projected area of the supporting surface(s) does not exceed 30 square inches; Class B, where the projected area of the supporting surface(s) exceeds 30 but is not more than 100 square inches; Class C, where the projected area of the supporting surface(s) exceeds 100 but is not more than 150 square inches; Class D, where the projected area of the supporting surface(s) exceeds 150 but is not more than 300 square inches; and Class E, where the projected area of the supporting surface(s) exceeds 300 square inches.

Wing Loading Requirements

INDOOR. There are no wing loading (weight) requirements for indoor model aircraft.

OUTDOOR MODEL AIRCRAFT POWERED BY INTERNAL COMBUSTION ENGINE(S). All model aircraft powered by internal combustion engine(s) shall be limited to a total flying weight of not more than 7 pounds, shall weigh not less than 80 ounces for every cubic inch of engine(s) displacement, and shall weigh not less than 8 ounces for each square foot of projected supporting surface(s).

OUTDOOR MODEL AIRCRAFT POWERED BY OTHER THAN INTERNAL COMBUSTION ENGINE(S). All outdoor model aircraft powered by other than internal combustion engine(s) shall weigh, complete and ready to fly, not less than 3 ounces avoirdupois for each 100 square inches of projected supporting surface(s).

OUTDOOR MODEL AIRCRAFT, NON-POWERED. Outdoor hand-launched gliders shall weigh, complete and ready to fly, not less than 2 ounces avoirdupois for each 100 square inches of projected supporting surface(s). Outdoor tow-line-launched gliders shall weigh, complete and ready to fly, not less than 3 ounces avoirdupois for each 100 square inches of projected supporting surface(s).

Categories

The Academy of Model Aeronautics has established the following model aircraft categories:

- INDOOR MODEL AIRCRAFT, POWERED—
  Stick Models, Hand-Launched.....Class B, C, D
  Stick Models, Rise-Off-Ground.....Class A, B
  Stick Models, Rise-Off-Water.....Class A, B
  Cabin Model, Rise-Off-Ground.....Class B, C
  Cabin Model, Rise-Off-Water.....Class B, C
  Autogiro, Launching Optional.....No classes for size
  Ornithopter, Launching Optional.....No classes for size
  Helicopter, Launching Optional.....No classes for size
- INDOOR MODEL AIRCRAFT, NON-POWERED—
  Glider, Hand-Launched.....Class A, B
- OUTDOOR MODEL AIRCRAFT, POWERED BY INTERNAL COMBUSTION ENGINE(S)—
  Cabin Model, Rise-Off-Ground.....Class A, B, C
  Cabin Model, Rise-Off-Water.....Class A, B, C
- OUTDOOR MODEL AIRCRAFT, POWERED BY OTHER THAN INTERNAL COMBUSTION ENGINE(S)—
  Stick Model, Hand-Launched.....Class C, D
  Stick Model, Rise-Off-Water.....Class C, D
  Cabin Model, Rise-Off-Ground.....Class C, D, E
  Cabin Model, Rise-Off-Water.....Class C, D
  Autogiro, Launching Optional.....No classes for size
  Ornithopter, Launching Optional.....No classes for size
  Helicopter, Launching Optional.....No classes for size
- OUTDOOR MODEL AIRCRAFT, NON-POWERED—
  Glider, Hand-Launched.....Class B, C, D
  Cabin Glider, Towline-Launched.....Class C, D, E

Official, Delayed, and Voided Delayed Flights

INDOOR MODEL AIRCRAFT, POWERED. An indoor powered model makes an official flight when it remains in the air for 60 seconds or more. An indoor powered model makes a delayed flight when it remains in the air for less than 60 seconds, hits an obstruction which prevents further flight, or hits an obstruction or another model which throws the model out of adjustment, changing its angle of flight so that it descends at an accelerated rate striking the ground or floor. Should a model hit an obstruction the timing device (stop watch) shall be permitted to run for an additional 10 seconds and if the model falls free independently and resumes flight within those 10 seconds, the

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If your dealer can't supply you, send check or money order—cash at own risk. Minimum order 50c. Include 15c for packing charge and postage on orders under $1.00. Shipments outside U.S. add 10%. (Remittances must be in U. S. Funds.) for P.P. Special Delivery in U.S. add 25c. (Ohio residents only, add 3% sales tax.)

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magazine with pictures of prizes, complimentary letters from every foreign countries, written about—

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nearly so quickly nor so completely of these models yourself. Remember, you select, they'll have plus values aerodynamic accuracy. They've reputation of "More Compliments, Any Other Model Line in the World."

THE REALEST THING YET IN WAR MODELS—because they're all ¾" scale

It's the New "Terror of the Skies"

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Beautiful 31½" authentic scale model of America's new twin motor 450 mile-per-hour "Terror of the Skies." It's fast! It's spectacular! It's the envy of every modelbuilder! Both motors pull—and how! It's popularity has been instantaneous, so don't delay building it. Strikingly colored yellow and blue. Complete Kit SF-75, only..... **$3.00**

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SPITFIRE

This realistic Cleveland model of the "Pride of the RAF" is the pride of any builder.

Beautiful 27½" model of England's popular interceptor fighter. Large wing area makes this an excellent flyer. Speedy. All silver (with suggestions for green and brown camouflaging). Complete Kit SF-73 only..... **$2.50**

"Pride of the R.A.F."

Daredevil "Cannon-Plane"

AIRACOBRA

Striking 25½" model of the plane that is fast coming to the front as the U.S.A.'s and England's standard pursuit interceptor. Gleaming all silver, and due to its long projecting nose, a perfect high speed flyer. If you prefer, the Airobonita may also be built from these plans. Complete Kit SF-76, only..... **$2.50**

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Sleek 24½" model of the Nazi's mass production fighter. Capable of good fast flights, and a sight to see with its black top and white belly, or dark green top with bluish-white belly) that makes it look like the shark it's intended to represent. Complete Kit SF-74, only.... **$2.50**

Due to the unavailability of many materials because of the nation's defense program seriously affecting the lines being or to be represented, we have had to withdraw our offer on race cars and the general catalog. Please refrain from ordering these until the general business situation is more settled. Customers who have remitted for these catalogs have already been notified by mail.

CURTISS HAWK P6-E Span 23⅜". Dry Kit SF-21.

$2.25

Dry Kit D-21 (span 15⅜")

85c

27 — Doolittle's Gee-Bee (SF-18⅝") **$1.50** (D-12⅛") **80c**

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49—Curtiss Goshawk (SF-23⅝") **$2.50** (D-13⅜") **85c**

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timing shall continue uninterrupted and the entire performance recorded as an official flight. If the model fails to fall free independently within the 10-second period, the timing device shall be stopped, the 10 seconds deducted from the total flight time and the entire performance recorded as a delayed flight. Three successive delayed flights displace one official flight; the duration of all delayed flights shall be recorded. If there is no official flight which surpasses the duration of a delayed flight, the contestant shall be entitled to a reinstatement of the delayed flight as his best official flight. An indoor model makes a voided delayed flight and is not credited with any duration time when it drops any part in flight or during take-off. Flights which are aided in any way, including the artificial upward displacement of air, shall be declared voided delayed flights. Pushing or touching a model during the take-off or flight constitutes a voided delayed flight.

INDOOR MODEL AIRCRAFT, NON-POWERED. All flights made by indoor gliders are official flights, regardless of duration. Delayed flights for indoor gliders are not recognized.

OUTDOOR MODEL AIRCRAFT, POWERED BY INTERNAL COMBUSTION ENGINES. An outdoor model powered by internal combustion engine(s) makes an official flight when it remains in the air for 40 seconds or more, providing that the engine run does not exceed 20 seconds. An outdoor model powered by internal combustion engine(s) makes a delayed flight when it remains in the air for less than 40 seconds, providing that the engine run does not exceed 20 seconds. Three successive delayed flights displace one official flight; the duration of all delayed flights shall be recorded. Should an outdoor model powered with an internal combustion engine collide in the air with another model, the contestant may declare the flight a delayed or official flight. If three successive flights are recorded as delayed flights, the contestant shall be entitled to the reinstatement of the longest of these three successive delayed flights as an official flight. If one or more delayed flights is (are) followed by an official flight, the contestant shall not be entitled to reinstatement of the delayed flight(s) in place of the official flight. An outdoor model powered by internal combustion engine(s) makes a voided delayed flight, and is not credited with any duration time when it drops any part in flight or during take-off. Flights which are aided in any way, including the artificial upward displacement of air, shall be declared voided delayed flights. Pushing or touching model during the take-off or flight constitutes a voided delayed flight. An outdoor internal combustion engine powered model makes a voided delayed flight when its engine run exceeds 20 seconds starting from the time the model is released for unassisted take-off by the contestant.

OUTDOOR MODEL AIRCRAFT, POWERED BY OTHER THAN INTERNAL COMBUSTION ENGINE(S). An outdoor model powered by other than internal combustion engine(s) makes an official flight when it remains in the air for 20 seconds or more. An outdoor model powered by other than internal combustion engine(s) makes a delayed flight when it remains in the air for less than 20 seconds. Three successive delayed flights displace one official flight; the duration of all delayed flights shall be recorded. Should an outdoor model powered by other than internal combustion engine(s) collide in the air with another model, the contestant may declare the flight a delayed or official flight. If three successive flights are recorded as delayed flights, the contestant shall be entitled to the reinstatement of the longest of these three successive delayed flights as an official flight. If one or more delayed flights is (are) followed by an official flight, the contestant shall not be entitled to reinstatement of the delayed flight(s) in place of the official flight. An outdoor model powered by other than internal combustion engine(s) makes a voided delayed flight, and is not credited with any duration time when it drops any part in flight or during take-off. Flights which are aided in any way, including the artificial upward displacement of air, shall be declared voided delayed flights. Pushing or touching a model during take-off or flight constitutes a voided delayed flight.

OUTDOOR MODEL AIRCRAFT, NON-POWERED, HAND-LAUNCHED. All flights made by outdoor hand-launched gliders are official flights, regardless of duration. Delayed flights for outdoor hand-launched gliders are not recognized.

OUTDOOR MODEL AIRCRAFT, NON-POWERED, TOWLINE-LAUNCHED. An outdoor towline-launched glider makes an official flight when it remains in the air for 20 seconds or more after the towline is released from the model. An outdoor towline-launched glider makes a delayed flight when it remains in the air for less than 20 seconds after the towline is released from the model. Three successive delayed flights displace one official flight; the duration of all delayed flights shall be recorded. Should an outdoor towline glider collide in the air with another model, the contestant may declare the flight a delayed or official flight. If three successive flights are recorded as delayed flights, the contestant shall be entitled to the reinstatement of the longest of these three successive delayed flights as an official flight. If one or more delayed flights is followed by an official flight the contestant shall

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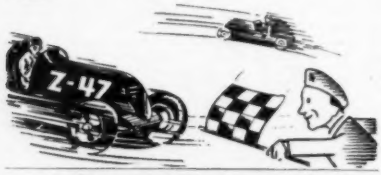

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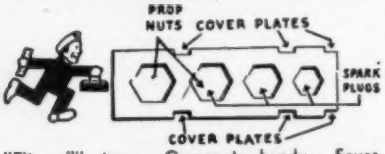

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not be entitled to reinstatement of the delayed flight(s) in place of the official flight. An outdoor towline glider makes a voided delayed flight, and is not credited with any duration time when it drops any part in flight or during take-off. Flights which are aided in any way, including the artificial upward displacement of air, shall be declared voided delayed flights.

Number of Flights

INDOOR MODEL AIRCRAFT, POWERED. Each contestant shall be allowed a total of 3 official flights, with 3 successive delayed flights displacing one official flight.

INDOOR MODEL AIRCRAFT, NON-POWERED. Each contestant shall be allowed a total of 9 official flights.

OUTDOOR MODEL AIRCRAFT, POWERED. Each contestant shall be allowed a total of 3 official flights in all outdoor powered model events, with 3 successive delayed flights displacing one official flight.

OUTDOOR MODEL AIRCRAFT, NON-POWERED, HAND-LAUNCHED. Each contestant shall be allowed a total of 9 official flights in outdoor hand-launched glider events.

OUTDOOR MODEL AIRCRAFT, NON-POWERED, TOWLINE-LAUNCHED. Each contestant shall be allowed a total of 3 official flights in outdoor towline-launched glider events, with 3 successive delayed flights displacing one official flight.

RECORD TRIALS. Unlimited number of flights are permitted in record trials provided sufficient timing equipment is available; the scoring of such flights, however, shall be according to the standard established for sanctioned competition.

Timing of Flights

INDOOR. Time of flight starts the instant a model is launched by hand or released for take-off and ends when the model touches the ground or floor after being launched, or meets an obstruction that prevents further flight.

OUTDOOR. Time of flight starts the instant a model is launched by hand or released for take-off and ends when the model touches the terrain after being launched, or meets an obstruction that prevents further flight. Time also ends when a model passes from the sight of the timer; should a model pass from sight of the timer behind a cloud or obstruction, the timing device (stop watch) shall be permitted to run for an additional 10 seconds and if the model reappears within those 10 seconds, the timing shall continue uninterrupted. If the model fails to reappear within those 10 seconds, the timing device shall be stopped and the 10 seconds deducted from the total official flight time. The timer shall make every effort to keep a model in sight until it lands. Timers at an outdoor contest shall remain on the field within a prescribed circle not to exceed 200 feet in radius, and timers shall keep models in sight only by use of normal vision (colored glasses and sun shades are permitted).

Scoring of Flights

INDOOR. Scoring time for indoor models shall be the longest of 3 official flights for powered models; the longest of 9 official flights for non-powered models. Flight duration shall be scored to the nearest tenth of a second.

OUTDOOR. Scoring time for all outdoor models except hand-launched gliders shall be the average elapsed time of 3 official flights. Scoring time for outdoor hand-launched gliders shall be the average elapsed time of the 3 longest of 9 official flights. In computing average elapsed duration time in seconds, the second numeral to the right of the decimal shall be dropped and the average elapsed duration time shall be scored to the nearest mathematical tenth.

Sanctioned Competition

SANCTIONED COMPETITION. The Academy of Model Aeronautics will sanction model aircraft competition which is conducted according to its official regulations.

CLASSIFICATION OF SANCTIONED COMPETITIONS. The Academy of Model Aeronautics classifies sanctioned contests and record trials as follows: Class A—"Closed competition," a contest open only to members of a single model airplane club, or affiliated model airplane organizations; Class AA—"Invitation" contest open to licensed model flyers with awards available to all who enter; Class AAA, state or regional championship contest which is large in size, draws 100 or more contestants, and offers important awards; Class AAAA, national and international championship contest, which offers traditional trophies of the Academy of Model Aeronautics; and Record Trials, a contest conducted for the sole purpose of providing an opportunity and facilities for attempts to establish or surpass official model aircraft duration records, with no special awards offered to the winners.

OFFICIALS. All sanctioned contests and record trials shall be conducted by a contest director who has been appointed by the Academy of Model Aeronautics. To receive appointment, a contest director must be a leader-member of the Academy of Model Aeronautics. The contest director may name as many assistants as are necessary to insure a well-run competition. As many of these assistants as possible shall be leader-members of the Academy of Model Aeronautics.

OFFICIALS SHALL NOT COMPETE. The contest director and all officials associated with a sanctioned contest shall not enter that contest. At no time shall any official of a sanctioned competition engage in any activities which interfere with the proper execution of his or her duties.

APPLICATION FOR SANCTION. Application for sanction of a model aircraft contest or record trials shall be made at least 30 days in advance of the competition by a contest director of the Academy of Model Aeronautics.

EQUIPMENT. Timing devices (stop watches) with graduations of not less than one-fifth of a second shall be used in sanctioned competition. Such scoring and recording aids as are necessary to insure a well-run competition shall be provided by the contest director or his assistants.

TAKE-OFF FACILITIES. Adequate take-off facilities shall be provided by the contest director or his assistants. Horizontal raised runways shall be not more than 6 inches off the ground or floor. For rise-off-water events the depth of the water shall be not less than one inch indoors and not less than 6 inches outdoors; the surface area of the water shall be large enough to permit free take-off.

TERRAIN. The terrain for outdoor competition shall not vary as to difference of level and location more than standard practice for landing areas of airports.

REPORT OF COMPETITION. A complete report of each sanctioned contest or record trials shall be filed with the Contest Board of the Academy of Model Aeronautics by the contest director within 7 days following the competition. The report shall include the names, ages, and addresses of all entrants and their individual flights in each category and class. Report(s) of record performance(s) shall be filed with the Contest Board of the Academy of Model Aeronautics by the contest director within 7 days following the competition. Failure to fulfill these requirements may result in revocation of contest director's appointment.

WHO MAY COMPETE. Only those who hold membership in a model airplane club affiliated with the Academy of Model Aeronautics shall be permitted to enter the events of a Class A competition. Only those possessing the gas model flyer's sporting license issued by the Academy of Model Aeronautics, or the special "Letter of Authority to Gas Model Flyers Under 14," shall be permitted to enter events for models powered by internal combustion engine(s) in Record Trials and Class AA, AAA, and AAAA contests. Only those possessing the gas model flyer's sporting license or the rubber model flyer's sporting license issued by the Academy of Model Aeronautics shall be permitted to enter events for non-powered models and models powered by other than internal combustion engine(s) in Record Trials and Class AA, AAA, and AAAA contests. The contest director of every sanctioned competition or his representative, shall examine the sporting license of each contestant to determine its validity and the contestant's eligibility to compete.

BUILDER OF MODEL. Each contestant shall assemble and cover all lifting surfaces and fuselages. The design may be obtained from any source. Only the builder may fly the model for record or in sanctioned competition. Models built from kits are acceptable. For all models other than those powered by internal combustion engines, the builder must build, carve, or complete the propeller(s).

NUMBER OF MODELS. Each contestant will be allowed a maximum of 3 models in each event, and he may use any or all to complete his flights. The 3 models used may be of different design; and if an event is announced as a general category without specific size classes, the 3 models used may be of different size classes.

IDENTIFICATION OF MODEL. Each model powered by internal combustion engine(s) shall have the sporting license number assigned to the builder by the Academy of Model Aeronautics permanently affixed to the upper side of the right-hand lifting surface. Each outdoor model shall have a registration certificate bearing the name and address of the builder and pertinent information concerning its size characteristics permanently affixed to the model.

CROSS-SECTION DRAWING OF CABIN. In cases of doubt, contestants shall present a full size drawing of the maximum cross-section of the cabin model; drawing shall be ruled into half-inch squares.

AGE CLASSIFICATION OF CONTESTANTS. Contestants under 16 years are classed as juniors; contestants 16 or more but under 21 years are classed as seniors; and contestants 21 years or more are classed as open flyers. Records are segregated as junior, senior or open, according to the age of the contestant when the record was established.

DISQUALIFICATION. Any contestant who breaks any rule of a contest, or conducts himself or herself contrary to the ordinary requirements of common courtesy, may be disqualified upon recommendation of the officials. Models broken in landing are not disqualified.

EXCLUSION. A sentence of exclusion may be pronounced by the local contest committee against

Dan Calkin *ANNOUNCES* the New

ELF "FOUR"

(Shown Actual Size)

Super Power for Class "C"

DAN CALKIN
Built the first class "A" motor of record in 1932 and called it the "Elf". His original Elf was featured by Ripley in "Believe it or Not" and earned a nation-wide reputation for dependability.

Pioneering again, Calkin started more than two years ago to develop a new, improved type of model engine. A few months ago he announced the first "twin" in class "A". His latest achievement is the first standard 4-cylinder model motor in the world—the new Elf "Four".

The new Elf "Four" is a new kind of model engine. It was developed from the Elf "Twin" whose sensational success convincingly proved the superiority of high efficiency, small bore motors with multiple cylinders. The Elf "Four" is the finest, smoothest running motor on the market. Like the Elf "Single" and "Twin", it features extremely high compression, better cooling and fast starting. The "Four" is the first high speed motor in class "C". Its surging power easily churns a 12-in. prop of 9-in. pitch at 7,500 R.P.M. Open it wide and it "revs up" like a full-sized tornado.

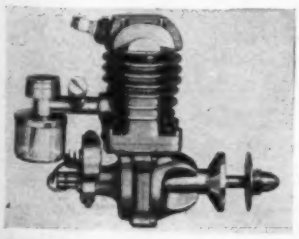
Develops 1/3 h. p.

Total Displacement .396 cu. in.

Have you a plane that will take the "Four"? It was designed for ships up to 10-foot span, radio control jobs, large model boats and model racing cars. At 7,500 R.P.M. *it produces more than 4 pounds thrust.* This tremendous power presents a challenge to every model builder.

LOOK AT THESE FEATURES

- 4 cylinders, opposed
- .468" bore, .564" stroke
- ⅓ h.p. at 7,500 r.p.m.
- Static thrust more than 4 lbs.
- 3 main bearings and 12-ball thrust bearing
- Pistons forged of aluminum and "micro-machined"
- Elf "No-Drag" Timer, fully enclosed
- New Elf Distributor fires cylinders in pairs
- Air filter on carburetor intake
- Streamlined transparent tank
- Radial mounting
- Weight, 9 ounces
- Price complete with Elf "Four" coil and condenser **$49.50**



New Elf "SINGLE"

Displacement .097 cu. in.

Designed for planes with wingspread up to 4 feet and weighing up to 2 pounds. The "Single" weighs 3 ounces and *develops 14 to 18 ounces of thrust!* Bore .468 in., Stroke .564 in. Has *two* main bearings, Elf "No-Drag" timer, air filter on intake. New low price, complete with (1½ oz.) Elf coil and condenser **$16.50**

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Displacement .198 cu. in.

The finest, most powerful class "A" motor you can buy. *Develops ¼ h.p. and 28 to 34 oz. thrust!* Smooth-running Elf "Twins" won 7 out of 8 meets in the Pacific Northwest flying 5-foot planes. Weighs 5½ oz., has *two* main bearings, 12-ball thrust bearing, Elf "No-Drag" timer, transparent tank, air filter on intake. Price, complete with Elf "Twin" coil and condenser **$31.50**

Available at better Hobby Shops everywhere
or order direct

ELF ENGINE CO.

"Builds Tomorrow's Model Motors Today"
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☐ Please arrange with dealer named below for an Elf demonstration at his store.

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My Hobby Shop Dealer _____ M-2

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any entrant from any event or from all events in a contest or Record Trials, if the contestant is ineligible to take part in the events, or guilty of misbehaviour or unfair practice. The local contest committee may order the removal of any entrant from the flying field or building who refuses to obey the order of a responsible official.

LOSS OF AWARD. Any competitor who may be excluded or suspended in any event shall thereby forfeit all right to award in that event.

PROTESTS. Protests will be considered only when presented in writing to the contest director within one hour after the close of the contest or record trials. The protestant must report in full the action or decision, the names of entrants and officials involved, and complete details.

APPEAL. Appeal may be made to the Contest Board of the Academy of Model Aeronautics on action taken on protest. Such appeals must be made in writing within a three-day period following the action of the local contest committee on the original protest.

EMERGENCY RULES. The contest director and the field judge may establish emergency rules if necessary, providing said rules are not in violation of official regulations of the Academy of Model Aeronautics.

Records

NATIONAL RECORDS. Perpetual American model aircraft duration records are homologated by the Contest Board of the Academy of Model Aeronautics. Perpetual records may be established at any time and shall continue until exceeded or affected by changes in the official regulations.

ACCEPTANCE OF RECORDS. No record is official until it has been homologated by the Contest Board of the Academy of Model Aeronautics. Only duration records for flying model aircraft are officially recognized. All records to be eligible for recognition must be made in sanctioned competition under the regulations of the Academy of Model Aeronautics.

General

PROJECTED AREA. The projected area of a supporting or stabilizing surface is the area seen when looking directly down on the surface. Supporting surface area enclosed in a fuselage or stick shall not be considered as wing area.

TUBE. A tube which is formed from sheet material shall not be considered as being built-up.

PUSHER-TRACTOR. The Academy of Model Aeronautics does not differentiate between pusher or tractor models for purposes of classification or record. However, such types are defined as follows: Pusher, a model airplane of the pusher type has its propeller(s) behind the supporting surface(s); tractor, a model airplane of the tractor type has its propeller(s) forward of the supporting surface(s); and tractor-pusher, a model airplane of the tractor-pusher type has its propeller(s) forward of, and propeller(s) behind the supporting surface(s).

VACUPLANE, ROTORPLANES. Vacuplanes and rotorplanes are not classified by the Academy of Model Aeronautics.

LIGHTER-THAN-AIR MODEL AIRCRAFT. Lighter-than-air model aircraft are not classified by the Academy of Model Aeronautics.

EXHIBITION SCALE, FLYING SCALE, AND RADIO-CONTROLLED MODELS. Exhibition scale, flying scale and radio-controlled models are not classified for purposes of record by the Academy of Model Aeronautics. Such models are encouraged and suggested regulations are included in the Official Contest Manual of the Academy of Model Aeronautics.

INTERPRETATION OF REGULATIONS. The Contest Board of the Academy of Model Aeronautics shall be the final authority in the interpretation and execution of these model aircraft classifications and regulations.

May 19—PITTSBURGH, PENNA. Class AA Third Allegheny Mountain Area Model Meet.
May 31—PHILADELPHIA, PENNA. Class A P.M.A.A. Indoor Championship.
May 31—BOSTON, MASS. Class A Jordan-Traveler Beginners' Competition.
June 1—MILWAUKEE, WISC. Class AA Cream City Gulls Meet for Gas Models.
June 1—BALTIMORE, MD. Class AA Aero-Craftsmen 1st June Meet.
June 1—ST. PETERSBURG, FLA. Record Trials for the St. Petersburg Model Club.
June 1—WASHINGTON, D. C. Class AA Capitol Model Aeroneers 1st Annual Meet.
June 1—STEUBENVILLE, OHIO. First Annual Sky Hawks Invitation Meet. Class AA.
June 1—GENEVA, N. Y. R.O.W. Record Trials for Gas, all classes.
June 7—PHILADELPHIA, PENNA. Class A P.M.A.A. Outdoor Championship.
June 7-8—BOSTON, MASS. Class AAA New England Model Championships.
June 8—DENVER, COLO. Record Trials for the Exchange Gas Model Club.
June 8—BUTTE, MONTANA. Class AAA Montana State Model Aviation Contest.
June 8—ALBANY, N. Y. Class AAA N. Y. State Exchange Model Airplane Meet.
June 14-15—ATLANTA, GA. Class AAA Southeastern Meet for Gas and Rubber Models.
June 15—SILVER SPRING, MD. Class AA Silver Spring Model Air Meet.
June 15—PITTSBURGH, PENNA. Class AA Fourth A.M.A. Meet sponsored by Aero Club & Boys Club.
June 21—ATLANTA, GA. Class AA Atlanta Aero Engineers Night Flying Contest.
June 22—SPRINGFIELD DEL CO., PENNA. Class AA 2nd Annual Springfield Gas Model Meet.
June 22—SCHENECTADY, N. Y. Capitol District Aeronautical Association Record Trials.
June 22—BELOIT, WISC. Class AA 8th Annual Southern Wisc. & Northern Ill. Model Airplane Meet.
June 22—PITTSBURGH, PENNA. Class AA Allegheny Mountain Seaplane Meet.
July 2-3-4-5—CHICAGO, ILLINOIS. Class AAAA 14th Annual National Championship Meet.
July 6—DENVER, COLO. Record Trials for the Exchange Gas Model Club of Denver.
July 6—ATLANTA, GA. Class A Atlanta Aero Engineers Club Contest.
July 12—BALTIMORE, MD. Class AA Aero-Craftsmen First Beachcombers Meet.
July 19—ATLANTA, GA. Class AA Atlanta Aero Engineers Night Flying Contest.
July 20—PITTSBURGH, PENNA. Class AA Fourth Allegheny Mountain Area Model Meet.
July 20—ALBANY, N. Y. Class AA Capitol District Aeronautical Association Model Airplane Meet.
July 20—OMAHA, NEBR. Class AAA Nebraska & Western Iowa Gas Model Airplane Contest.
July 27—OTTUMWA, IOWA. Class AAA Iowa-Midwestern Gas Model Contest.
July 27—BALTIMORE, MD. Class AAA Fourth Annual Contest of the Baltimore Model Airplane Association.
July 27—MAYFIELD, N. Y. Class AA Capitol District Association Model Seaplane Contest Record Trials.
July 27—ATLANTA, GA. Class AA Atlanta Aero Engineers Seaplane Contest.
August 3—SILVER SPRING, MD. Class AA Silver Spring Model Air Meet.
August 3—ATLANTA, GA. Class AA Atlanta Aero Engineers Seaplane Contest.
August 10—DENVER, COLO. Record Trials for the Exchange Gas Model Club of Denver.
August 15-16—ST. LOUIS, MO. Class AAA 9th Annual Mississippi Valley Model Airplane Contest.
August 16—ATLANTA, GA. Class AA Atlanta Aero Engineers Night Flying Contest.
August 17—PITTSBURGH, PENNA. Class AA Fifth Allegheny Mountain Area Model Meet.
August 17—ALBANY, N. Y. Capitol District Aero Ass'n Class AA Sailplane & Glider Meet.
August 24—BALTIMORE, MD. Third Annual Class AAA Gas Model Meet of the Aerocraftsmen.
August 24—ATLANTA, GA. Class AA Atlanta Aero Engineers Seaplane Contest.
August 31-September 1—ATLANTA, GA. Class AAA Labor Day Meet.
September 14—PITTSBURGH, PENNA. Class AA Sixth Allegheny Mountain Area Model Meet.
September 14—DENVER, COLO. Record Trials for the Exchange Gas Model Club of Denver.
September 14—SILVER SPRING, MD. Class AA Silver Spring Model Air Meet.
September 20—ATLANTA, GA. Class AA Atlanta Aero Engineers Night Flying Contest.
September 21—PINE VALLEY (BERLIN) N. J. Pine Valley Fall Class AAA Gas Meet.
October 5—PITTSBURGH, PENNA. Class AA Allegheny Mountain Area Model Championships.
October 5—DENVER, COLO. Record Trials for the Exchange Gas Model Club of Denver.
October 5—ATLANTA, GA. Class A Atlanta Aero Engineers Club Contest.

MODEL AIRCRAFT CONTESTS AND RECORD TRIALS SANCTIONED BY THE CONTEST BOARD OF THE ACADEMY OF MODEL AERONAUTICS

This listing is to acquaint readers of MODEL AIRPLANE NEWS with dates of meets in their vicinity. When additional information is desired as to exact location or name and address of a contest director, drop a note to Academy Headquarters, Willard Hotel, Washington, D. C., and enclose 3c in stamps with each request.

April 5—BOSTON, MASS. Class A Jordan-Traveler Indoor Meet.
April 6—ATLANTA, GA. Class A Atlanta Aero Engineers Contest.
April 12—PHILADELPHIA, PENNA. Class A P.M.A.A. Indoor Endurance Meet.
April 13—PITTSBURGH, PENNA. Class AA Allegheny Mountain Area Model Meet.
April 19—BOSTON, MASS. Class A Jordan-Traveler Indoor Meet.
April 20—PINE VALLEY (BERLIN), N. J. Class AAA Spring Pine Valley Gas Meet. $400 in prizes.
April 26—PHILADELPHIA, PENNA. Class A P.M.A.A. Sixth Indoor Flying Scale Meet.
April 26—BOSTON, MASS. Class A Jordan-Traveler Outdoor Meet.
April 27—SACRAMENTO, CALIF. Class AA Superior Calif. A.M.A. Gas Model Contest.

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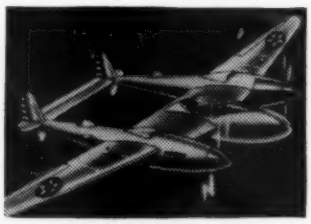
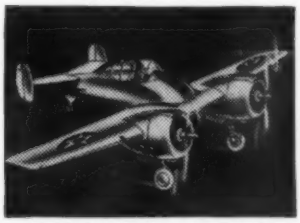
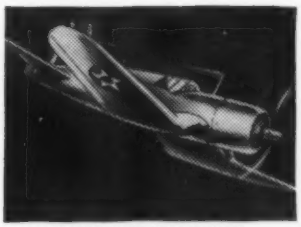

LOCKHEED PURSUIT

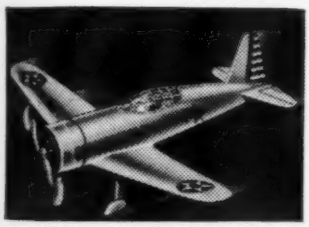

GRUMMAN SKY ROCKET

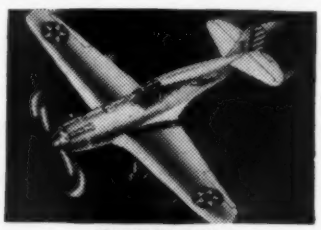
The three models above are exhibition models. Not recommended for flying.

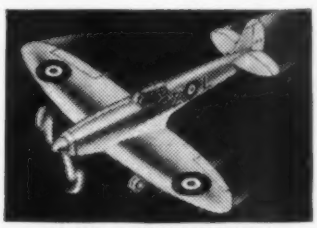
STUKA DIVE BOMBER

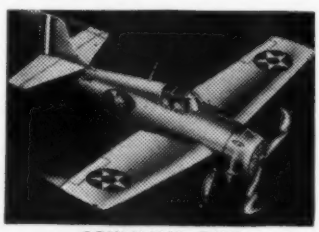
DOUGLAS DIVE BOMBER


VOUGHT SIKORSKY


VULTEE VANGUARD 48


CURTISS P-40


SUPERMARINE "SPITFIRE"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April 27—SCHENECTADY, N. Y. Class A Schenectady Aeroneers Outdoor Contest.

April 27—SILVER SPRING, MD. Class AA Silver Spring Model Air Meet.

May 3—PHILADELPHIA, PENNA. Class A P.M.A.A. Third Outdoor Endurance Meet.

May 3—BOSTON, MASS. Class A Jordan-Traveler Indoor Meet.

May 4—ST. PETERSBURG, FLA. Gas Model Record Trials for St. Petersburg Model Club.

May 4—ATLANTA, GA. Class A Atlanta Aero Engineers Contest.

May 11—DENVER, COLO. Record Trials for the Exchange Gas Model Club of Denver.

May 11—PITMAN, N. J. Class AA Spring Gas Meet.

May 17—PHILADELPHIA, PENNA. Class A P.M.A.A. Fourth Outdoor Endurance Meet.

May 17—BOSTON, MASS. Class A Jordan-Traveler Indoor Meet.

May 17—ATLANTA, GA. Class AA Atlanta Aero Engineers Night Flying Contest.

May 18—ALBANY, N. Y. Class AA Schenectady Aeroneers Model Plane Meet.

Thermal Thumber

(Continued from page 21)

none are available an ordinary ruler will serve the purpose.

The stabilizer and wing mount ribs on plate three are enlarged in the same manner to 1/4" squares. The remainder of the drawing should be fairly easy consisting of simple scaling up.

Fuselage

Select four medium-hard 3/16" square balsa for the main longerons. Use wood that is straight-grained and free from warpage. These should be pinned in place over the plan, making two sides at the same time. This method insures true conformity for both sides.

Next cement in the cross pieces. Note that from station 1 to 3 are 3/16" square while from station 4 back they are 3/16" x 1/8". This should be allowed to dry overnight and while waiting you can start on some other part of the ship.

When the sides are dry they should be split apart with a thin double-edge razor-blade and the assembling of the fuselage begun. This is done in the conventional manner, first pinning the front and rear and then cementing in the remaining cross pieces. The main structure is now completed and the balance of the construction should be started. Cut the firewall from 1/8" birch plywood to the shape shown on the plan. The landing gear of 3/32" wire is then mounted on the firewall with copper wires and the entire assembly is cemented in front of the 3/16" cross pieces at station 1.

The motor mounts, made from 1/4" x 1/2" bass are next cemented in place and braced at station 2 with the formers shown on plate 3. Now before going any further in the construction it is best to install the ignition system. Remember a carefully wired ignition system repays. Follow the plan very carefully in this step. Note that the booster connections are the spring in the battery box and a soldered wire on the Austin timer. It is a good idea to solder all connections as an added precaution. The wing mount is made with a 1/8" hard sheet balsa core and planked on either side with 1/16" hard sheet balsa. Be sure that the grain in the middle is run opposite to the grain on the sides (see plan for directions).

Wing mount ribs 1 to 5 are cut from 1/16" balsa and cemented in place in their respective positions. The wing mount cradle (4 pieces of 1/8" x 1/8" x 2") is next glued in place and the entire assembly is ready to be covered with silk.

For those who have had no experience in silk covering, a few pointers will be necessary. First cut a piece of silk to a rough outline of the wing mount with a margin of 1/2" all around. Put cement on the center rib (No. 2) and lay the silk on top of it; use pins to hold it in place, for you will find it does not hold as easily as paper does when first applied. Let the cement set for a few minutes and then put some on rib 1 and the top half of the wing mount outline. Stretch the silk over this pulling in all directions until it is as tight as possible; then pin it in place and allow to dry. The lower half and other side is finished in the same manner. The 11/8" square balsa is glued in place in the top of the fuselage to support the wing mount. The fuselage is now planked with 1/16" sheet in the area shown on the plans. Note that the timer is mounted behind station 4 and the single pen-cell battery box between station 5 and 6. After the planking drys the wing mount is inserted in its channel and securely cemented. It is important to have a very tight fit where the mount joins the fuselage. To insure this the distance between the 1/8" square braces should be accurately measured. The tail block and tail mount are shown full size on plate 2. These are cut from their respective sizes of balsa and glued in position. Since the cradle determines the angle of incidence of the stabilizer, follow dimensions carefully. When this is completed the nose blocks of 1/4" balsa are glued on the motor mounts and firewall. Do not leave these out as they give a great deal of strength to the motor mounts.

The sub-rudder is glued in position and as a final fuselage assembly step the tail skid of .040 wire and dowels to hold wing and tail are inserted in place and cemented. We now use grade 1/0 sandpaper and sand the entire fuselage assembly removing all glue bumps. Fair the planking, longerons and nose block together by this sanding method. To aid the appearance we found that by slightly rounding the outside edges of all longerons it added materially to the good looks of the model after it was covered.

Wing

The first step is joining together the main spar (3/16" x 5/8" hard balsa) with the required dihedral. The wing jointers are made from 1/8" hard balsa and cemented to each side of the spar. The whole joint is then wrapped with thread. While this is drying the ribs may be cut from 1/16" balsa and the leading, trailing edges and wing tip are pinned in place over the plan. When the spar has dried pin it in position, lifting it off the plan with 3/16" blocks. The ribs are cemented in place with the exception of the one at the dihedral-break to make the polyhedral forming easier. Polyhedral is then built in before taking the wing half off the plan. Similar steps are taken in forming the other half.

Covering

The original job was covered with yel-

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low and red Silkspan, but of course the color scheme and type of covering is optional. Give the body at least three coats of clear dope and the wing and tail at least two. Trimming the plane is left to the builder's individual taste.

Flying

Before flying the model be sure the thrust is correct; that is, 6° down and 2° left. Be careful of any warp in the wing or tail, and if any should occur, take it out before flying is attempted. The plane was balanced at 45% back from the leading edge of the wing. It may be necessary to put a little positive or negative incidence in the stabilizer to obtain a good glide. The model should have a slight right circle (looking from back to front). When the glide is perfect (and only then) the power flights should be attempted. Keep increasing the power on each succeeding flight and note its flight tendencies. Take care of all turns in the climb by motor adjustment; that is, by offset thrust. When the motor is finally opened wide be sure and set your timer for a maximum of 20 seconds, as any more time than this will probably result in losing your ship. . . . We know, we lost three and our maximum motor run was 18-1/2 seconds.

As a final note, no matter what comment is received or criticism offered, don't be afraid to continue the pen-cell in the operation of your ship: We found that use of one pen-cell creates a mild furor wherever we have flown (with many attempts to show or disprove this theory), but as yet have to experience our first difficulty in the use of one pen-cell.

Frontiers

(Continued from page 17)

has the slightest resemblance whatsoever to the original masterpiece, the designer is liable to win the Collier Trophy for the outstanding achievement of the year.

The high wing of the Botha appears to be of constant chord as it extends from the fuselage and bumps into the underslung engine nacelles. As the wing tapers towards the tips from the nacelles a slight dihedral is added. The engine nacelles are, of course, equipped with cooling flaps. The bottom of the nacelles extends straight aft and is chopped off abruptly before coming in contact with the wing split-flaps. On former airplanes it was a practice to flare the bottom upwards and fair it into the wing's lower surface. This pronounced curvature created excessive drag, and then the "shovel type" nacelles were employed, as used on the Blackburn Botha. American designers, now, have gotten away from the "shovel type," which has a rather ugly appearance, by extending the nacelle aft a considerable distance beyond the trailing edge of the wing and bringing the rear to a point, i.e. the A-20, B-25 and B-26. The landing gear retracts into the nacelles. Unlike most twin-engined bombers, bomb racks are located beneath the wing. So much for the Blackburn Botha. It may not be as spectacular as the other "streaks of lightning" that Britain is now producing; but it will play an important role in upholding the economic structure of the Empire.

Below is a list of some of the names given new American airplanes purchased by the British:

Consolidated B-24, "Liberator"; Lockheed-Vega bomber, "Ventura"; Lockheed interceptor, "Lightning"; Lockheed reconnaissance, "Hudson"; North American AT-6, "Harvard"; North American BT-14, "Yale"; North American NA-73, "Mustang"; Martin 167, "Maryland"; Martin 187, "Baltimore"; Brewster fighter, "Buffalo"; Curtiss P-40, "Tomahawk"; Douglas DB-7, "Boston."

Not so very long ago Mr. Penrose, a well-known British pilot, very successfully put a new British fighter through its preliminary paces for Great Britain's noted aircraft manufacturer, Westland. These tests were conducted with superlative secrecy and later the ship was

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Kit contains full-size plans, STREAM-LITE wheels, fuselage silk, Silkspan for wings, formed wire landing gear, clear and color dopes, plenty of extras. A sensation in the 1941 model field.

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The first small ship in the gas model field, now making a stirring comeback as a Class A performer. Originally cost $4.95, same kit less wheels now at $1.49. Designed for real flying ability, but simple to build, efficient and almost crack-proof. Build one and watch it score for you in those contests.

The Answer in Class A

TOPPER-A

$3.50 *Postpaid*

Gordon Murray's last ship, the TOPPER-A, is slightly smaller than the original ship, and ideal for Class A engines from .15 to .199 cubic inch displacement. Climbs like a rocket and Sky-Scraper wing gives that flat, contest-winning glide. Really deluxe kit has body silk, Silkspan for wings, STREAM-LITE wheels, most parts ready-formed, a bargain at this price.

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placed in actual war duty. This hush-hush "speed demon" is known as the Westland Whirlwind and will go down in history as the R.A.F.'s only twin-engined fighter. The moths have finally pounced on the Whirlwind's cloak of incognito, as a little news leaks through to us. In the first place, the "Whirlwind" will "run rings around" the twin-engined Messerschmitt 110, its only comparable rival. The reason for this speed, which surpasses 400 m.p.h., is the Whirlwind is powered by two Rolls Royce Merlin engines, as used on the Spitfires and Hurricanes. From what we could learn, the ship apparently is a two-seater with a power gun turret.

Lockheed, incidentally, is designing a two-place ship with power turret along these lines and equipped with Wright "Tornado" engines. And then again there are probably more of the new Hawkers, also named "Tornado," than Whirlwinds in active service in the R.A.F. We will endeavor to get more details on the Hawker Tornado, as well as a look-in on the Hawker "Typhoon," than those already published in a past issue of MODEL AIRPLANE NEWS.

The first of the rightfully-named Lockheed "Lightnings" is about ready for its British purchasers. Like several of the new airplanes being produced, mainly the new interceptor-pursuits, the new V-12 Continental engine may be installed in some of Lockheed P-38 interceptors. The Continental engine is liquid cooled and, though smaller than the Allison engine, is said to have more horsepower. If the Continental engine works well, and from all reports it seems to be doing just that, Continental Motors will certainly be up in the "big time."

There has been much blabberings in the news that American aircraft were poorly armored. This has been a topic of great discussion and argumentation by people who know, and others who do not know, what it is all about. Editors have written reams and reams on the meager armorings of American aircraft. The fact is that they have not been armored at all. For that matter we doubt if the English planes had much armor before the war started, and if they did, they certainly kept it a big secret. But to settle the question we will state here that if they want armored airplanes in Europe, armored airplanes they will get . . . 1/4"-inch steel sheet and on up. The Lockheed-Vega "Ventura," which is even larger than Lockheed's commercial Model 18, will be the closest thing yet to a "flying war-tank" in this country. The Boeing B-17E will be power turreted, armor plating for all crew members and bullet-proof fuel tanks and lines. It is possible that the future will bring forth a tail gun, remotely controlled, on this Flying Fortress. Most of our new single-engine pursuits now have a thick sheet of steel as a firewall behind the engine to protect the pilot when attacking a counter-volleying bomber.

We gave a long discourse some months ago on what was being done to protect American aircraft against bullets, and now we can add that airplanes are rolling down the production lines so equipped. So the Englishman that said the armoring of most American aircraft is a laugh will soon eat his words. He will probably enjoy them. We might bring out the fact, however, that though the American designer thought high speed would take care of the necessity of an abundance of armor plating, he did not neglect the subject altogether. The little single-place Model CW-21 interceptor that Curtiss-Wright produced a few years ago had a thick steel bulkhead in the rear of the pilot for protection as well as other forms of bullet-proofing. Today it also has a bullet-proof glass wind-shield.

In the matter of armament, the British still are ahead by lining up 12 machine guns on their Spitfires and perhaps as many on the new Hawker products, Tornado and Typhoon. We have installed as many as six to eight guns on airplanes and no doubt are destined to go into the mass installations like everything else, sprinkling a cannon here and there as we go merrily on our way. One company is considering the use of a 75 mm. cannon

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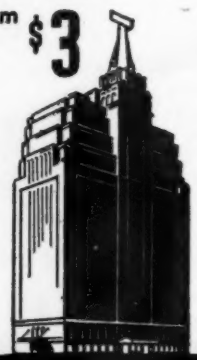

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for blowing Nazi submarines apart. The Bell Airacobra for the British has eight machine guns and a 37 mm. cannon.

Following we have some details on the North American NA-73 "Mustang" being built for Great Britain in quantity. It is powered by a 1090 hp. Allison engine, giving the plane a long, pointed snoot and a resulting high-speed output. From general appearances the cowling has been wrapped tightly around the engine with little clearance to spare, and we think this feature makes the Mustang the modern interceptor with the smallest frontal area in the world. A slight gull contributed to the wing as it fairs into the fuselage gives the plane added "finesse." A retractable radiator scoop is located aft in the bottom of the fuselage for cooling the oil and Prestone for the engine.

The wing span is 37 ft. and length is 32 ft. Having a gross weight of 7,708 pounds, the airplane has a wing loading of 32.6 lb./sq. ft. On 105 gallons of fuel the airplane has a range of 640 miles. The airplane has an exceedingly wide tread and appears to be an easy ship to fly in spite of its high speed of well over 375 m.p.h. As is usually the case with Allison-powered airplanes, the Mustang is very quiet in the air when turning over its three-bladed Curtiss electric propeller.

It is planes of the high-speed interceptor type that will most likely make the greatest use of jet propulsion, gaining 20 to 25 m.p.h. by its use. When speeds of 500-600 m.p.h. are reached jet propulsion will add another 50-60 m.p.h. The principle of jet propulsion is as follows:

As the red hot exhaust gases shoot through the exhaust manifold they have a tendency to expand. By narrowing down the diameter of the exhaust tail pipe, as it extends aft, forms a sort of "torture chamber" for the gases that are endeavoring to expand and thus they shoot out the "bottleneck" of the exhaust tail pipe at a very accelerated speed; at such a speed, as a matter of fact, that they form a compact with the air as if running into a stone wall. This compact with the air gives the airplane an added boost forward. In other words, it is nothing more than the rocket principle. When we mentioned last month that two companies were working on jet propulsion, it soon cropped up that practically every company has a finger in the pudding. Besides using this on the "Excalibur," Lockheed may also incorporate the feature on its still larger transport, yet unannounced. This new transport will have four engines and has been ordered by Pan-American Airways.

Now that Northrop's new single-engine seaplane for Norway has been thoroughly tested, it is found a high speed of 217 m.p.h. at 16,500 altitude can be obtained. Cruising speed is around 150 m.p.h.

A new North American B-25 medium-bomber has made its appearance with gulled wings. The center sections have dihedral as they fair up into the engine nacelles and the outer panels extend straight out, thus further mystifying the fact as to where do these high speed twin-engined bombers get their stability? But they are plenty stable, and British pilots have even gone as far as to say that the Douglas "Boston" is as easy to fly as any other combat airplane they have been in. Glenn L. Martin, who just recently gave to the world a startling new high-speed medium-bomber, is already in the throes of another design which we believe will be the XB-27. We rather imagine it will be for the sub-stratosphere. As the new combat planes leave the factories for the U. S. Army Air Corps they are camouflaged, and it has been noticed that on the twin-engined medium-bombers the red, white and blue stripes are missing on the rudders and the white star in blue background with the red polka dot is painted on each side of the fuselage where the British "bull's eye" is located. The Martin PBM-1 for the U. S. Navy has a star at the bow, and thus the war has begun the changing of our aircraft insignia.

And as we go to press here are some varied tid-bits: The Ryan PT-20A trainers for the U. S. Army have been equipped with Kinner engines as well as the new Ryan ST-3. Stearman is flight-testing a new primary trainer of low-wing design. Fleetwings has produced an all-stainless steel primary trainer known as the XBT-12. It is a-la North American Aviation, Inc. Culver has equipped one of its little low-wing cabin monoplanes with a nose wheel for tests.

Write and tell us what you are doing with your model planes.

HITTING THE * "THIRD-CYCLE" with the TIGER AERO!

As each Tiger engine leaves the testing room the scheduled "run-in" period is completed with a roaring blast of power.

As the peak "two-cycle" speed of ordinary engines is easily exceeded and a Tiger engine suddenly charges forward to reach a new speed—one observer remarked, "Boy, she's hit the ceiling now!" An experienced motor man nearby added, "It's more than that; these Tigers take the gun and hit a new cycle—it must be the THIRD CYCLE!"

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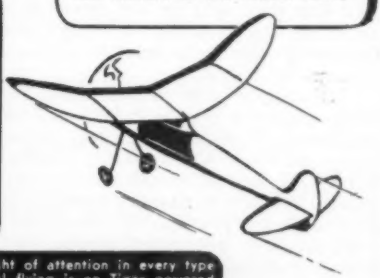
Everyone familiar with model motor operation first learns to recognize the "put-put" four-cycle speed. This slow running speed attained just after the engine starts is regulated with a "rich" fuel mixture at the needle-valve.

TWO-CYCLE SPEED . . . *FAST*

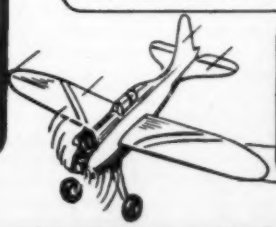
Adjusting the Needle valve down will produce a two-cycle speed on nearly every engine made. This more powerful two-cycle speed is recognized by a surge in speed and more frequent firing. Engines yielding greatest power per cubic inch seem to leap ahead in R.P.M. at this point. There is a definite pick-up and sharp, cracking tone at the exhaust.



"THIRD-CYCLE" *Tiger R.P.M.*

Just as there is a sudden change in tone, R.P.M., and horsepower when an engine is brought to a two-cycle speed; Tiger engines on adjustment of the needle-valve and spark advance make another jump in speed and reach what is known as the "THIRD-CYCLE."

*THIRD-CYCLE observations made using standard 12" Victory propellers.



● The spotlight of attention in every type of gas model flying is on Tiger powered airplanes. Tiger engines with "third-cycle" R.P.M. and horsepower are proving unbeatable among all engines in the most popular C class competition.

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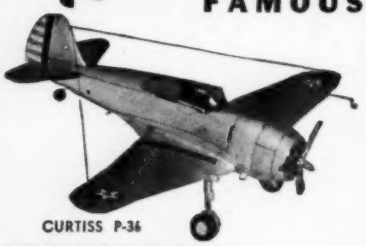

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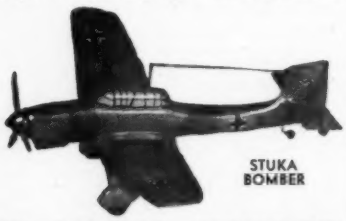

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Thundering Sky Herd

(Continued from page 19)

forthwith the Grand Prize.

The company continued to progress when in 1907 they began construction of automobile bodies and were forced to move into an entire city block in Long Island City. Their reputation and craftsmanship grew until they began making only custom-built bodies for the finest and most expensive limousines, including the famed Rolls-Royce machines in England.

Continuing to move with the times, the company entered aviation in 1920 with the construction for the United States Navy of a large number of aluminum-alloy seaplane floats. This work led to perfection of a new process and later a complete squadron of navy scout-observation planes was equipped with the first spot-welded stainless-steel floats ever constructed.

In 1932, at the very depths of the depression, James Work formed the Brewster Aeronautical Corporation to coordinate the many designs, equipment and personnel of the aviation division of the famed carriage works. Still more seaplane floats were built, some for the export market.

However, James Work was anxious to get started on an airplane design. His twelve years experience with the U.S. Navy, during which he was an executive officer at the Lakehurst Naval Air Station and at the Naval Aircraft Factory in Philadelphia and with the Detroit Aircraft Corporation (makers of many all-metal Lockheed "Vega" monoplane), made him capable of more advanced work than building of seaplane floats. So the company began construction of all-metal aircraft parts and subassemblies. All the wings and tail surfaces of the renowned Grumman biplane fighters were built in the Brewster plant, as well as seaplane floats for Vought, wing-tip floats for Consolidated, and many other subassemblies.

With this experience and the contacts thus made, Brewster decided to launch into the aircraft construction field. Thus in 1934 work was begun on an entirely new-type fighting craft and early the following year the Brewster XSBA-1, two-seat high-speed scout-bomber was introduced. Two years later came the single-seat XF2A-1 single-seat navy fighter. And now comes the "Buffalo," the latest product of a firm which was making fine carriages before your great-great-grandfather was born! Proud indeed is the heritage of our Plane on the Cover this month, for it bears one of the most famous names in American mechanical history: the Brewster "Buffalo" Model 439 single-seat fighter!

Basically, the Buffalo is a single-seat midwing cantilever monoplane of all-metal construction featuring a fully retractable landing gear and tail wheel. Its purpose is high-speed day and night fighting and interceptor work and its heavy armament and exceptionally good visibility qualifies it admirably for this trying function.

FUSELAGE: The fuselage is built in a single full monocoque unit. Its structure consists of a series of pressed flange bulkheads and formers, numerous longitudinal channel-section extruded stiffeners and an exterior covering of 24 STAL aluminum-alloy aluminum-coated Alclad skin sheet. The fuselage is almost circular in cross section, giving the ship its short, sturdy appearance.

There are four heavy extruded section longerons at the four corners of the main structure, which carry flight and landing loads. The upper rear portion is a built-up section of half-frames, stringers and sheet covering and carries no load. The entire lower forward portion of the fuselage shell is cut away to allow the entrance of wing and landing gear assembly which are built integrally in a single installation. The central upper portion is open to provide for the cockpit; the rearmost portion is removable to provide tail surfaces and tail cone installation. There is a baggage compartment on the right-hand side.

WINGS: the wing is the full cantilever type built in five sections; a center section which attaches to the fuselage, two outer panels and two removable tip sections. The structure consists of two main load-carrying members built up of a single sheet web with extruded-type cap strips on both top and bottom. There are two of these webs, forming a strong, rigid box-spar combination for the plane's main load-carrying. These spar webs are connected by leading edge, intermediate and trailing edge rib sections which are riveted to the webs through use of pressed flanges on their front and rear faces. This structure is connected by laterally laid extruded stringers and the entire framework covered with 24 STAL Alclad sheet skin.

The center section attaches to the fuselage at four points, two on each spar, through the use of heavy bolts. The outer panels connect to each end of the center section through use of six major bolts on both front and rear spar attach angles. These joints are covered with strip sheeting which carries no load, serving only to preserve the wing's contour. The two detachable tips are screwed into place with numerous flat-head screws about the contour of the wing. Each outer panel carries a running light with suitable wiring running in to disconnect boxes for ease of dissembly.

There are two large cutouts for the landing gear struts in the center section leading edge on either side of the fuselage. The ailerons are all-metal aluminum alloy 24 ST construction and are both statically and dynamically balanced. They are fabric covered and equipped with trimming tabs controllable in flight from the cockpit. Two center section landing flap panels are incorporated on the underside of the trailing edge, hydraulically operated. They are of stainless steel spot-welded construction, the lower surface consisting of a single large sheet of stainless steel presenting an extraordinarily efficient surface to the slipstream.

EMPENNAGE: The vertical and horizontal stabilizers are of all-metal full cantilever construction. They are built up on a framework of five ribs and two spars; the rear spar of which serves as a facing plate for the control surface. This structure is covered with 24 STAL Alclad and is bolted to attachment points provided in the rear end of the fuselage. The vertical stabilizer carries running light and an antenna mast.

The rudder is of stainless steel spot-

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6 3/64 x 2 sheets balsa print wood
1 1/8 x 2 x 15 sheet balsa
4 1/8 x 1/2 x 14 balsa strips
1 1/8 x 3/8 x 16 balsa strip
25 1/16 x 1/8 x 14" balsa strips
12 1/16 x 1/16 x 13" balsa strips
1 Balsa nose block
1 Shaft bobbin
1 3/16" dowell
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2 Metal nose block fittings
2 Metal propeller fittings
2 Steel rear post fittings
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welded construction, aerodynamically and statically balanced. It is fabric covered and equipped with a trimming tab operable from the cockpit while in flight.

The elevators are of similar construction to the rudder and are interconnected through a single large toque-tube which runs through the fuselage tail cone. Two internal horns are welded to this tube to which are attached the control cables. Both elevator halves are equipped with trimming tabs.

LANDING GEAR: The landing gear is the conventional two-wheel type with tail wheel located at the rear end of the fuselage. The main landing gear is fully retractable and is the novel Brewster-patented type in which the wheels fold into the fuselage for stowage, their outer surface forming the contour of the fuselage side panels. The strut folds into the wing's leading edge, with a large plate sealing the opening.

The strut and cover plate are welded together and the shock absorber, wheel and brake assemblies are mounted in fixed positions at the lower ends. A small strut completes the truss, running from the main strut's inner edge inward to the fuselage landing gear cut-out wells. This strut breaks in the middle and folds inward carrying the wheel after it. The entire mechanism is simple, neat and compact. Retraction is hydraulic, through the use of the engine-driven hydraulic pump which supplies pressurized hydraulic fluid to the main system. The brakes are hydraulically operated through an independent system connected to the pilot's foot pedals.

POWER PLANT: The Brewster Buffalo is powered by a single large Wright Cyclone GR-1820-G205A nine-cylinder air-cooled radial which develops 1200 horsepower at 2700 r.p.m. at sea level and has 1200 horsepower available for five minutes duration at 1800 feet. It is equipped with a two-speed blower; the low blower gear is used up to 9500 feet, then the high blower gear gives 1,000 horsepower at 13,500 feet. The oil tank is located in the upper portion of the engine compartment accessory cowl and has a capacity of 14 gallons of oil. The fuel is carried in a single large fuselage fuel-tank located below the main wing. This tank is divided into two individual compartments encased in a special rubberized fabric material making it self-sealing. It has a total capacity of 160 gallons of 100 octane hi-test aviation fuel. Air is taken into the down-draft carburetor through a streamline inlet duct located in the upper portion of the ring cowl, from whence it is routed back and down into the carburetor mixing chamber. The oil cooler is of the core type, mounted on the lower engine mount support tubes. Air is taken through an annular opening similar to the carburetor air duct located in the bottom portion of the leading edge of the nose cowl. The engine cylinders are cadmium plated for anti-corrosion resistance to salt spray and air.

The propeller is the Hamilton Standard three-bladed quick-feathering Hydromatic type and has a diameter of 123 inches. It is equipped with the new propeller "cuffs" described for the first time in these columns in the March, 1941, issue of MODEL AIRPLANE NEWS in connection with the Martin B-26 medium bomber. The entire nose of the propeller feathering and constant speed-control gear is encased in a huge conical nose spinner which further increases the propeller mount's efficiency. The spinner nose has a large hole to release internal air pressure built up during high speed operation.

The welded steel tubing engine mount is X4130 chrome-molybdenum steel tubing and is designed in two bays, the engine support truss and accessory compartment bay, which attaches to the fuselage proper. The firewall is located aft of the second bay near the front spar of the wing. The engine mount is equipped with Lord anti-vibration rubber shock mountings. Aluminum alloy 2S0 fuel and oil lines are equipped with flexible couplings at all joints to further lessen effect of engine vibration at high crankshaft speeds.

Also of welded steel tubing is the fuselage over-turn structure, located immediately above and behind the pilot's headrest which protects him in the event of a nose-over in landing.

PILOT'S COCKPIT: The single cockpit of the Brewster Buffalo is located high atop the mid-point of the fuselage, giving the pilot the best visibility ever found in this type ship. He is protected from the elements through the use of a plexiglass windshield and moulded plastic acetate sheet sliding canopy which slides to the rear. There are four panels aft of this structure to provide visibility aft. A large headrest is located on the front face of the overturn structure. A large tubular stainless steel container is located immediately aft of this in which are stored emergency life raft, emergency provisions and a small signal pistol. He is equipped with a complete set of instruments, flight and engine types being grouped according to function. The electrical switch control panel is located on the lower left side of the engine instrument sub-panel. The throttle, mixture and propeller control handles are mounted together on the upper left-hand side of the cockpit. Complete radio transmitting and receiving equipment is installed.

ARMAMENT: The Brewster Buffalo is one of the heaviest armed fighting ships designed in the United States, carrying two synchronized guns firing through the propeller and two free-firing guns in each outer wing panel. The nose guns are of the Colt-Browning M-50 design, of 50 caliber; two cartridge containers carrying 500 rounds of ammunition for each gun. These guns are synchronized to fire through the propeller through the use of two impulse generators located on the vertical accessory drive pads of the engine, an impulse tube assembly and two trigger motors mounted one on each gun. The wing guns are of the Colt-Browning M-30 design, of 30 caliber capacity each; they are equipped with canisters carrying 250 rounds of 30 caliber cartridges for each gun. They are fired through the use of an electric solonoid mounted on each gun trigger motor.

Guns are all linked with the main machine-gun firing control panel located on

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Actual Photograph of Vultee Vanguard Model

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Indeed an engineering triumph—accomplished by outstanding G.H.Q. designers and engineers, who have constructed into the G.H.Q. motor everything that years of exhaustive scientific aerodynamic research could produce—geared to the highest possible degree of perfection. But more than that, the acid test . . . an overwhelming response. Thousands of users in all parts of the country are praising, recommending, and endorsing this scientific achievement. It seems as if everyone in America wants one. The most hair-raising thrill you've ever experienced will be yours with the G.H.Q. motor—actually one of the most powerful motors ever constructed. Has broken records for amazing performance.

30 MINUTES TO ASSEMBLE

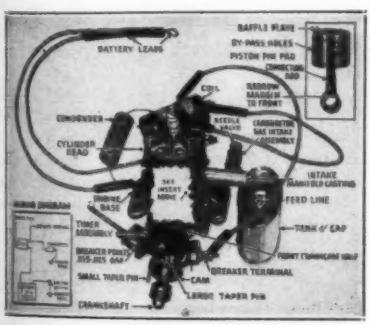
•

ALL PARTS WARRANTED

Imagine operating your own G.H.Q. ⅛ Horse Power gasoline engine—small enough to fit in the palm of your hand—yet turning up over 7000 revolutions per minute and powerful enough to fly model airplanes of from 4 to 10 foot wingspan, and propel model boats from one to six feet in length and midget cars that travel over fifty miles an hour!! There are also hundreds of other ways you can enjoy using this miniature yet powerful power plant—for small pumps, generators, compressors, blowers, fans, grinders and countless other experimental purposes.

Your G.H.Q. gasoline engine will be far more than just a toy for your spare moments. It is a scientifically constructed mechanical marvel that will thrill you with thousands of hours of pleasure. You will get a real kick out of controlling with your finger tip the surge of power your engine develops.

This engine has been tested and proven over the last eight years. OVER FIFTY THOUSAND OF THESE POWERFUL LITTLE G.H.Q. ENGINES ARE NOW IN ACTUAL DAILY USE. Why not join the ranks of these hobbyists?



ENGINE IS COMPLETE and Ready to Assemble

Your engine comes to you with every part completely finished. Our factory-trained skilled mechanics, using the latest automatic precision machinery, have finished each and every part to the last detail. You merely assemble the parts in accordance with the few simple instructions given, using only an ordinary screwdriver, and inside of thirty minutes, your engine is ready to operate.

Not only will you and your friends have the thrill of seeing an engine ASSEMBLED BY YOURSELF operating, but you will gain a knowledge of gasoline engine theory and practice that will be a real practical value to you.

SPECIFICATIONS OF NEW 1941 MODEL

4 Port 2 Stroke Cycle. ¾" Stroke. 15/16" Bore. 300-7,000 R.P.M. Bearing Surface, 1¼" Long. Crankshaft, 5/16" Diam. Rotation, Either Direction. May be run inverted. 1/5 Horsepower. Class C under NAA Rules.

G. H. Q.'s EIGHTH YEAR!

Thousands of Satisfied Users! Read some of these testimonials on file with us:

J. B., Providence, R.I.—"A few weeks ago I received the G.H.Q. motor kit and it is running perfectly. I hope to write you soon and tell you about some excellent flights."

R. H., Prairie du Chien, Wis.—"Your motors sure can take a lot of abuse and knocking around and yet perform perfectly. I have had two in a period of about two years and have seen higher priced motors give less service and performance."

W. W. W., Russellville, Ark.—"I received my G.H.Q. Motor Kit and am very well pleased. W. L., Claysburg, Penn.—"A wonderful motor that thrills any air-minded person. Strong and neat looking. As good as motors costing twice as much."

A. K., Hillside, N.J.—"I still can't understand how you can put such a dependable and rugged engine on the market at such a low price."

E. T., Sayville, N.Y.—"Received my G.H.Q. Kit okay and am more than delighted with same. You've got 'em all beat for price and performance."

R. P., Hamburg, N.Y.—"I want to extend my personal thanks to G.H.Q. for their prompt service. The motor I ordered was received within 24 hours. Such service cannot be surpassed. I also want to say that I have the motor running perfectly. I shall do all I can to help promote the success of G.H.Q."

H. H., Midlothian, Ill.—"Motor assembled correctly and performs perfectly. I am fully satisfied."

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Identical Engine Less Coil & Condenser

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THE G. H. Q. GAS ENGINE CAN BE USED IN BOATS, MIDGET CARS & PLANES WITHOUT ANY CHANGES

The G.H.Q. Gas Engine sold six years ago for $35. Over 7000 were sold at $8.50. Today, you can secure a vastly improved engine kit for only $3.95 or $4.95 or factory-assembled for only $6.50. How is this possible? Simply because we have invested thousands of dollars in tools, jigs, dies and equipment to produce the only mass-production motor in the market. All parts are uniformly perfect.

1940 SALES OF G. H. Q. ENGINES AND KITS TOTALED 15,000

DEALERS!

Get your share of G.H.Q. business! Write for new Discount Schedule.

This identical G.H.Q. Gasoline Engine Kit is also available in factory assembled, fully bench tested and ready-to-run form.

This comes to you already tuned up . . . ready to mount and run, complete with coil, condenser & wires.

G. H. Q. "Ready-to-run" Engine $6.50

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We ship Collect C.O.D. for balance. For shipments outside U.S. send full amount plus $1.00 for packing, postage and insurance.

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Miniature Gasoline Engines and Model Airplanes

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Sea Wasp
36", Class "A"
Flying Boat
for Super ATOM Unique Wing and Motor Mount design $2.95

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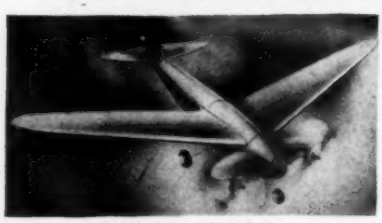
For *RADIO CONTROL* It's The SUPER DOLFIN



SPAN 9'6"—LENGTH 6'

This remarkable plane incorporates features that are ideal for RADIO CONTROL and ENDURANCE FLYING. Developed over a period of four years the SUPER DOLFIN displays the following aerodynamic features.

- 150% increase in air thrust power.
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the left side of the fuselage, which is in turn connected with the gun trigger located on the stick. There is only the single trigger, the selection of the guns desired being handled by the gun-selector-switch located on the firing control panel. This panel is marked "50 CAL." "30 CAL. L.H." "30 CAL. R.H." and "ALL." The cocking handles are all mechanically handled through use of a steel cable assembly.

Also included on the Brewster Buffalo is armor plating, a small plate being affixed just aft of the oil tank forward, a large plate behind the pilot aft, and a large plate under the floor. The windshield is also of 3/4 inch-thick bulletproof glass so not only can the Buffalo "dish it out" but "it can take it"!

SPECIFICATIONS: The Brewster Buffalo has a wing span of 35 feet and is 26 feet 2-1/2 inches long. It stands 11 feet 11.9 inches high and has a wing area of 208.9 square feet, giving it an aspect ratio of 5.86.

PERFORMANCE: The Brewster Buffalo has a top speed of 335 miles per hour at a gross weight, including fuel, oil, emergency equipment and ammunition of 6840 pounds. It cruises at 310 miles per hour with a service ceiling of 24,500 feet. It can climb to 13,500 feet in 7 minutes and can climb to 25,550 feet, its absolute ceiling when fully loaded. It has a landing speed of 74 miles per hour making it no ship for the novice pilot! Extra tanks in the form of streamlined exterior dropable designs may be fitted to give it a range of 2,500 miles. Ordinarily, however, it has a range of only 650 miles and a duration at cruising speed of a little over two hours.

The Brewster Buffalo is one of the fastest, most compact, maneuverable and rugged ships of its class ever constructed. Originally known as the U.S. Navy model F2A-1, it was re-designed, including larger hatches, a larger vertical stabilizer and nose cowl refinements and was known as the F2A-2 as such being sold in quantity to the U.S. Navy as a shipboard fighter. At the time of Germany's invasion of Belgium, however, it was on order as the model 339. After the fall of Belgium, France and ten other independent, free nations to Adolf Hitler, the contract was taken over by the British Government. Now, with the addition of more armament, armor plating, self-sealing fuel tanks and other British requirements, it is known as the Buffalo model 439 and, as such, is on order for the Royal Air Force. Production is well under way and the first dozen of these ships has already seen service, although no reports of its success has reached us as yet. However, the Brewster Buffalo will carry on the name that started more than a century ago when young James Brewster tried his hand at building a carriage to catch the eye of the young ladies of Connecticut. With such a heritage behind it, it will have a future before it!

Gas Lines

(Continued from page 25)

matter.

Picture No. 5 shows a Model Turner Laird Special, one of the winners in the Sky Blazers Contest. The details of this model were beautifully worked out but the picture does not do it justice. You will note our old friend, Roscoe Turner, in miniature, standing besides the ship.

We take pleasure in presenting the winning award in this month's Original Design Contest to Albert Knowlton of 210 Pleasant Street, Marblehead, Mass. His entry, picture No. 6, is a upique little autogiro and shows expert handling of the design problems involved. Features of note are: Pusher propeller, allowing excellent forward vision; boom tail of unusual design and the twin rudders. This is a very practical design and a ship built in this manner should give excellent results. It is quite possible, however, that the boom would have to be of greater cross section in order to withstand the stresses developed by the tail. Nevertheless, from a practical sense, it would be quite possible to strengthen this.

Picture No. 7 shows a beautiful KGS built by Charles F. Warren, who is now studying engineering at Rensselaer Polytechnic Institute, Troy, N. Y. He says the model weighs 4 lbs. 1 oz. and "flew very well indeed, though the wing loading was almost one pound per square foot. The job proved to be very stable, even in windy weather. The second job he built averaged about 2 1/2 minutes in *calm* air. The models were powered with a Super Cyclone and Tiger Aero, respectively.

This month we have had a number of remarks concerning excellent flying qualities of models with high wing loadings; this seems to be a universal experience with modelers who have flown heavy ships. Heavy Jobs are just as efficient as light ones; however, they do have a slightly greater sinking velocity and greater flying speed, the latter making crashes more damaging. If you wish to figure relative impact of models, it may be determined by the formula: $I = MV^3$ (Constant). Where M is the mass or weight of the plane and V its velocity. In other words, two planes weighing the same, but one having twice the speed, would have four times the impact and consequent damaging value. The heavier plane would have to be made four times as strong to withstand a crash as readily as the lighter one.

Picture No. 8 shows a model of an extremely interesting ship, the Fokker D-8 of World War I fame. It is built by Ted Enticknap of Route 9, Box 237, Seattle, who says he built this scale job because "builders become tired of run-of-the-mill jobs." The model is 6 ft. in span and follows the full-scale job in all respects except slightly more dihedral and a simplified landing gear. The model weighs 3 1/2 lbs. and is a fast, snappy flier. It has been flown many times, surviving several crack-ups with no damage other than broken propellers. It is powered with a Brown D engine. Ted says the plane is a "community affair," as Bud O'Rourke, his friend, is half-owner. The project, undertaken in this manner, reduced individual expenses.

If you are interested in this model, we would suggest you do not fail to look in the June, 1941, issue of MODEL AIRPLANE NEWS for plans of a beautiful Fokker D-8 gas job, designed by Earl Stahl.

Picture No. 9 shows a Soaring Eagle equipped with floats, built by J. W. Chandler of 2136 Watson Avenue, St. Paul. It has a 54 in. spread, weighs 24 oz. and is powered by an Ohlsson "23" engine. Without the floats its weight is 19 1/2 oz.

No Price Raise Yet!

FOR ONLY 7.25

PHANTOM MOTORS

A WORD OF WARNING! With raw material prices rising, cost of labor soaring upward, it is only a question of time before the price of the finished product must also rise.

But through our policy of selling direct from the factory to you, we are still able to deliver you either a Torpedo or a Bullet with no increase in price as yet. Remember by dealing direct with the factory you effect a savings of $5.55 on the Phantom Torpedo; $5.50 on the Phantom Bullet.

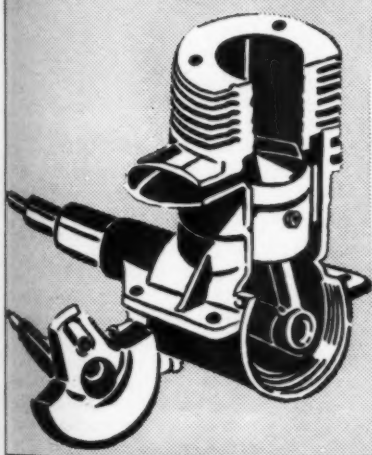
NOW there is no reason why you, too, can't install a Record Breaking Phantom in YOUR model . . . the same type motor that took one model to 11,500 feet, has flown another 55 miles, has stayed up 2 hours, 46 minutes, 43 seconds.

Don't delay! Send the attached coupon today! And your Phantom Motor will come streaking back to you ready for installation. Ready to break records for you!

BULLET & TORPEDO CLASS "B" ENGINE FEATURES

- New special heavy duty type radial motor mounting (replacement plus standard beam mounting).
- Special float type gas gauge (Torpedo only).
- Newly designed larger sturdier gas tank made from Magnesium alloy.
- Gas tank can be mounted on either side of the fire wall.
- All motors equipped with the new Smith "Fire-Cracker" Coil.
- Torpedo produces almost 1/5 hosepower with weight of 4¾ oz. Bullet produces almost 1/6 horsepower with weight of 4¾ oz.
- Motors built to be used upright or inverted. Your motor on its way 24 hours after order received.
- Every motor power block tested in our factory and sold to you under a bonded factory guarantee.

BULLET SPECIFICATIONS
1/7 h.p.; 2 cycle rotary valve; ¾" bore; ⅜" stroke; .275 cu. in. displacement; bare weight 4½ oz. Gravity feed carburetion; Diamond bored crankcase; hardened steel timing cam; solid steel case hardened crankshaft; die cast Magnesium connecting rod; lapped alloy steel piston; fully equipped heavy duty radial mounting.



NEW VALVE PRINCIPLE AND IMPROVED CRANKSHAFT IMPROVES PERFORMANCE
Undreamed of performance by use of new SQUARE VALVE increases engine performance as much as 15 to 20%. Square valve stays open longer than old round type. Lets more gas into gas chamber, thereby developing more power. An additional improvement is the new crankshaft which is fully counterbalanced for longer engine life. Made from reduced weight case hardened steel. Features a new small type center hole.

TORPEDO SPECIFICATIONS
1/7 h.p. @ 14,000 r.p.m.; 2 port 2 cycle type; bore .725; stroke .724; static thrust 30 to 32 oz. plus; displacement .2989 cu. in.; weight 4¾ oz.; downdraft carburetion; plus size Magnesium gas tank; Champion V-2 spark plug, exclusive offset principle . . . easier starting, more power; metal enclosed condensers; additional crankcase fins; Diamond bored crankcase; oversize anti-friction bronze bearings; lapped alloy steel piston; die cast Magnesium connecting rod; special new type heavy duty radial mounting.

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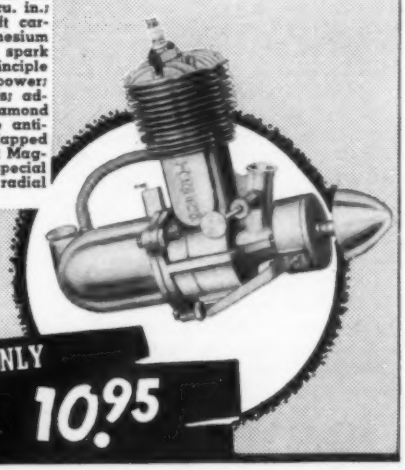
Torpedo Only



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Please RUSH the items checked below:

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[ ] New improved 1941 Phantom "Bullet" complete with coil, tank and condenser - - - - - - - - - $7.25
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[ ] Miss Tiny Kit, Propeller and Phantom Built "Bullet" $11.95

Add 3% if delivery point is in California.
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It's a SNAP
to start your "OK"
SUPER POWER "49"
Class "C"
Complete with exhaust stack, coil, plug and condenser $15.50
NEW
For race track and boat basin
"OK" TORNADO
Especially designed for race track & boat basin
It Breathes Power
Bore .900; Stroke .950; Disp. .604
Complete, incl. coil, plug & condenser $24
Consistent
Flip an "OK" engine over once or twice—and up she roars! You'll never get shut out because of balky starting—a thrilling "run for your money" every time! Their sturdy, rugged appearance inspires confidence—their magnificent performance—consistent under all conditions!—has made them a prime favorite with the best-known, prize-winning experts in the field! The next time you visit your dealer give an "OK" your critical "double-o" (once-over!)
There's an 'easy to start' OK for
AIRWAY-RACEWAY-MARINE
'49' .493 $15.50
SPECIAL .604 15.50
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"OK" Easy-Starting engines featured at all dealers.
Illustrated brochure and wiring diagram 3c.
HERKIMER TOOL & MODEL WORKS
HERKIMER, (Dept. A-6) NEW YORK

Though it takes about 200 ft. to get off the water, once in the air the ship flies well with floats or wheels.

James N. Arnold of Perry and Bluff Streets, Marseilles, Ill., is another hydro fan and in picture No. 10 you see his Commander with floats, powered with a Brown. He says: "It takes off with about a 60 ft. run and flies beautifully. It noses over occasionally in rough water, but this doesn't seem to hurt its flying qualities, for, after drying out the engine, a Brown, it starts right up again, ready for another flight."

The plane displays fine workmanship.

Bill Hyland sends us picture No. 11, showing his SE-5 gas job, which he built last spring. He says:

"It took me about three months of steady work and lots of help from several of my friends to finish it. The credit for advice and manual help goes to Ted Just, who was on the '37 Wakefield Team, and Ray Llewellen, a former Jr. Pitt student in aeronautical engineering and at present a flying cadet at Tuscaloosa, Alabama.

"Help in the manual form came from Merle Clapsaddle, president of the Johnstown High School Aviation Club. I was once a member of this organization.

"As to the model, the basic plans came from plans you had in your magazine nearly two years ago. I doubled the size. It has a six foot span, and the rest is in proportion to the wing span. I consider it pretty accurate and close to scale. It placed second in a scale model contest. The exhaust stacks and cowling are both made of sheet metal, removable for flying. The wheels are hard wood, turned out on a lathe. They are interchangable with air wheels. The prop, of course, is not to scale. I also did not get a chance to add balsa farings to the landing gear or cabane struts, nor did I get a chance to fly it aside from a few test glides. The reason being I joined the U. S. Army Air Corps soon after completing the model. The motor that was in the ship when the pictures were taken was a G. H. Q. I also had a Brown, but though both ran well I hadn't run them 'in' enough for ease of starting. This prevented my flying the ship before I left. I was also 'tender' on the subject of flying it after sinking over 300 work hours in it myself, and my buddies' total number almost equaled that. I did test-glide it a few times and it handled fine. It has orange tail and wings and a dark blue body. The machine gun is silver and black and is made of balsa. The wings are removable: A system which I devised myself. I built it very light because of the power-weight ratio."

Hyland just completed the Meterology Course at Chanute Field and is now assigned to Langley Field, Virginia, Headquarters & Headquarters Squadron, 2nd Bombardment Wing, G. H. Q. Air Force. He has been in the army for six months and is apparently enjoying his experience. He will be glad to hear from other builders.

Picture No. 12 shows a Curtiss Hawk P6-E detailed scale model, by Thomas F. Stout of 6086 Englemen Avenue, Centerline, Mich. It has a span of 20 in. and required weeks of spare time to construct. The cockpit is complete in all details. The model is finished with ten top coats of dope; the propeller is an exact scale of a Hamilton Standard controllable pitch prop. This is a beautiful job and Stout is to be complimented for his work. We hope other members of the Air Ways Club will follow Stout's example and send pictures showing the work they are doing.

Another unique scale model is shown in picture No. 13; a Seversky P-35, very ingeniously built from pictures—not plans—appearing in various magazines. It required two years of part-time work to complete; has a 48 in. wing span and contains 11,000 separate pieces. Landing gear, tail wheel, landing flaps and all movable controls are operated from the cockpit. Bashfully hiding under the cowling is a 14-cylinder Pratt & Whitney engine in miniature. The plane can be taken apart and requires about three hours to reassemble. It is covered with 1/16" balsa except the controls, which are fabricated. The total weight is 4 1/4 lb. The builder is Peter Nemeth of 606 S. Pulaski Street, South Bend, who can be justly proud of this fine piece of work. If you will look closely you will notice that even the cowl flaps are hinged so that they operate.

Colorado

We have some interesting comments from Robert L. Marchant, 476 University Blvd.; a member of the Exchange Gas Model Club of Denver:

"On February 2 the Exchange Gas Model Club of Denver inaugurated a contest which the members have found most entertaining and exciting.

"I refer to our Cross Country Contest, which has been described a number of times in our paper 'Flight.' We do not pretend our idea is original, but we do believe it has enough merit to pass on to other organizations for what use they might put it to.

"In our Cross Country Contest each contestant must, figuratively speaking, fly from Denver to New York City and return. Each second in the air represents one mile, and since the distance from Denver to New York City and return is 3,338 air miles, this will require almost an hour of flying. This naturally stretches the contest over a good many sundays. However, the minutes mount up surprisingly fast when an accurate check up is made and we now find our leader, Ten Holmes, has reached New York City and is on his way home with a total of 1934 air miles. We now have fourteen entries in the contest, each of them stretched across the continent from the Nebraska line to the Atlantic Ocean.

"In order to increase the flyers' interest, we have included some penalties as well as merits: Such as loss of 50 miles for changing planes, loss of 25 miles for delayed flight and a reward of 50 miles for a crack-up. Also each contestant must stop at predesignated cities to do a little sight-seeing. These are Omaha, Chicago, New York City, and on the return Washington, St. Louis, Kansas City and Colorado Springs. This means that anyone reaching one of these cities on a certain flight cannot pass that city on that flight. This, we have found, gives 'the slow pokes' a chance to catch up. It also keeps the leaders from 'running away' from the rest of the field.

"We are flying under strict AMA rules

GRUMMAN F3F1

U. S. NAVY SHIPBOARD FIGHTER

32" Span. Length 24". 1" Scale

A fine detailed model with retractable landing gear, 4" turned balsa motor front, 3 oz. grey dope, ½ oz. yellow, 2 oz. glue, etc. All parts printed on balsa, 10" propeller, wheels, rubber motor, full size drawing, and all parts. This fighter plane is used in large numbers on the aircraft carriers. Const. Set complete. postpaid. **$3.75**

CURTISS HAWK F11C4 PURSUIT NAVY

32½" Span. Length 22¾". 1" Scale. Weight 6 oz. Color grey, top wing yellow

THE MOST EXCLUSIVE AND FINEST EQUIPPED MODEL IN THE WORLD. MOVABLE CONTROLS WORK FROM COCKPIT. A special de luxe model, one of the most beautiful ever made. Set contains a 4½" scale Wright Cyclone celluloid motor, detailed push rods, fins, etc., like real motor, 4½" aluminum cowl, 10" steel type carved prop shown, 2¼" wheels, tail wheel, star and rudder insignia and lettering, rubber, windshield, instrument board, flying wires, 4 aluminum step plates, aluminum wing walks, ready cut wheel pants, washers, 3 oz. grey paint, ½ oz. yellow, ½ oz. red, 2 oz. glue, etc. All other parts are printed on balsa wood. 33"x44" scale drawing. Const. set, complete in labeled box, postpaid..... **$4.50**

NEW TAYLORCRAFT SPORTPLANE

36" Span. Length 22". 1" Scale. Weight 2 oz.

COMBINATION LAND AND SEAPLANE SET

A beautiful exact scale flying model with unusual flying range, so light it will rise from land or water in 6 feet. Const. set contains all parts printed on balsa, carved propeller, hardwood wheels, 2 oz. white dope, ½ oz. black, glue, full sized scale drawing, and all parts to build, and parts to make floats. Set p.p..... **$1.50**

9-FOOT 1941 TAYLORCRAFT GAS MODEL

9 Foot Span. Length 66". 3" scale

MODEL ¼ SIZE OF REAL PLANE. CAN USE RADIO CONTROL.

One of the easiest gas models to build. Has special wing airfoil for slow landings. Set has ready cut wing ribs, gear struts, nose piece, etc., set of paints, dope, glue, etc. Model weighs 3¾ lbs. without motor, suitable for radio control. Lifts 4 lbs. additional weight. Full size scale drawing. Const. set, postpaid, less wheels and motor..... **$15.00**

Set includes metal tail wheel fork and rubber wheel.

Additional equipment if desired:

18" carved propeller	$ 1.50
5 yards silk	2.00
1 pair 4½" M & M Air Wheels	2.75
½ h.p. Forster Gas Motor	20.75
⅛ h.p. Brown, Jr., Gas Motor, Type B	16.75

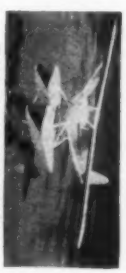
GRUMMAN F5F1 SKYROCKET NAVY FIGHTER

24" Span. Length 17". Weight 3 oz.

A beautiful scale model of U. S. Navy's fastest 450 m.p.h. pursuit.

Const. set has all parts printed on balsa, balsa motor fronts, carved 7" props, grey and yellow dope, glue, full size drawing, and all parts. Const. set, post-paid **$2.95**

TAYLORCRAFT MODEL WITH FLOATS ON



CURTISS SO3C1 NAVY SEAPLANE

30" Span. Length 27". Color, silver and yellow

Const. set has all parts printed on balsa, silver, yellow and black paint, glue, prop, full size drawing, and all parts. Set, postpaid..... **$3.00**

SEVERSKY P35 ARMY PURSUIT

32" Span. Length 25". 1" Scale. Color, silver

Set has 4" turned balsa motor front, 10" carved prop, balsa wheels, tail wheel, rubber, all parts printed on balsa, 3 oz. silver dope, ½ oz. black, 2 oz. glue, etc., insignia, and full size scale drawing. New improved model has retractable landing gear and movable controls from cockpit. Set, postpaid..... **$3.25**

BOEING B-17 FLYING FORTRESS

44" Span. Length 30". Color, silver

Set has all parts printed on balsa, four 2" turned balsa motor fronts, four 4" carved props, celluloid wheels, set of paints, glue, and full size drawing. **$4.50**
Set, postpaid.....
De luxe set with 4 aluminum cowls, 4 celluloid motors, 4 metal props, and 2 M & M air wheels. **$6.25**
Set, postpaid.....

CURTISS F11C4 SOLID MODEL

10½" Span. Length 7½"

This is a special de luxe solid model. Set has completely finished balsa fuselage, cockpit cut out, routed pants, wings cut to shape, 1½" de luxe cast motor, alum. cowl, 3 bladed cast prop, paints, drawing and all parts. Set p.p..... **$1.50**

CURTISS P36 ARMY PURSUIT

37" Span. 1" Scale. Color, silver

Set has turned motor front, set of paints, glue, all parts printed on balsa, and full size drawing. **$3.25**
Set, postpaid.....
Set with 4" celluloid motor and aluminum cowl, postpaid..... **$4.25**

BOEING P26A ARMY PURSUIT

22" Span. Length 17½". ¾" Scale

Set has all parts printed on balsa, 3" celluloid motor, 3¼" tapered aluminum cowl, set of colored paints, scale drawing, and all parts. **$2.75**
Set, postpaid.....

NORTHROP A-17 ARMY FIGHTER

24" Span. Length 16½". ½" Scale

Set has 7" prop, turned motor front, wooden wheels, complete set of paints, all parts printed on balsa, scale drawing, insignia, and all parts. **$2.50**
Set, postpaid.....

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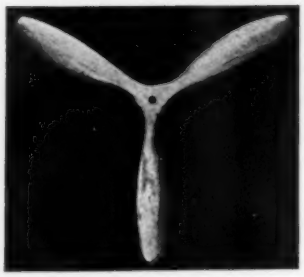

1. If you are now using a 14-inch standard prop you can use 12-inch three-bladed and get better performance.
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4. Real plane performance and looks.
5. Sure to be a winner in spring contests. Especially recommended for the new "U-Control Planes."
6. These three-bladed props are guaranteed to withstand the most powerful motor on the market.
7. Weight 2 oz. for 12-inch prop.

All props finished $1.50. Add 15c for postage. Sizes are 8-9-10-11-12 inches. 12" weighs 1 oz. No C.O.D.s. Dealers write for prices.

ROBERT E. JOHNSON
1437 LAVETA TERR. LOS ANGELES, CALIF.

as regards planes and motor specifications, time of motor run, method of take off, etc. The entry fee is fifty cents with the first $5.00 going as a prize and the remainder put in our treasury. We have in the process of preparation a map of the United States with colored pins designating each flyer, these pins placed in relation to the flyers' position. In this way he can tell at a glance just where he is.

"We have found this contest has stimulated flying during the months when it ordinarily is at a low ebb."

"The current leaders in the Cross Country Contest are: Ted Holmes, 1934 miles; Don Spalding, 1793 miles; A. K. Holmes, 1669 miles."

Florida

We have news from Bill Wilson, secy.-treas. of the Palm Beach Model Airplane Club, 616 Evernia Street:

"This club was organized in 1938, under the direction of Mr. Norman K. Bennett and Mr. Wesley B. Jackson. It started with ten members; we now have forty. We have had difficulties, as any club starting will have, but now believe we're making progress. Present officers are: Bob Lewis, President; Mr. J. B. Marion, Vice-President and Bill Wilson, Secretary-Treasurer.

"Our club has gained many honors throughout the state and was represented at the 1940 Nationals by its two best builders, Albert Schultz and Joe Tschirgi. Although we have average dues, we have been able to maintain a treasury of $48.27.

"We have sponsored two state-wide contests and have weekly club contests with small cash awards as prizes. Our last state-wide contest, which was held in late December, was the most successful. The day was fair except for a 20-mile wind and the field having a little water on it. There were 50 contestants and 100 models participating. The best flights during the day were made by H. Silvers of Little River; his Class C ship out-flew and outglided all others. His longest flight covered over 7 miles and missed the Atlantic Ocean by about fifty feet.

"B. 'Pahokee' Alterman of Miami, with his Class "A" Twin Elf-powered ship, was said to be one of the fastest climbing A jobs in existence. Many models flew out of sight during the day but most of them were recovered; because of the wind many models crashed.

"In the Open Rubber Event A. Nelson of Lakeland placed first, C. Richbourgh second and H. White third. In the Glider Event, R. Gene Chaille first, N. Cammerbeke second and H. Peny third.

"H. Silvers of Little River won the club's three-time award trophy with the highest three-flight average of the day in Class C.

"In the gas events there were 10 prizes in each event, and in Rubber and Glider Events there were five awards. There were $150 worth of prizes awarded at the contest and every contestant making an official flight received a gallon of gasoline."

California

Frank B. Secrest of 816 Tangier Court, Mission Beach, corresponding secretary of the San Diego Aeroneers, writes:

"Our club is composed of seventy-two members to date. Nearly all are active, taking part in our monthly contest held at the end of every month on our own field on Camp Kearny Mesa.

"In our contest, held February second, the respective winners of the first three places and their times were: Ross Hauck 12:2; V. C. Hill 10:2; Harold Strawn 9:55. This contest was a great success in spite of being rained out the week before, causing postponement.

"We are now making plans for our annual contest on April 27. It is to be a South-Western championship. Anyone wishing to get information about this or any of our contests or the club, write to me."

Connecticut

Here are a few words from Ed Whitten of 949 Academy Hill, Stratford:

"What! You haven't heard of the Bridgeport Aeronuts? Well, let me say this: Holding outdoor contests every month throughout the year, though the weatherman may do his worst, we are now flying indoors at the local armory as well. Do we experiment? Why we run regular contests for low-wing models. Our membership is getting larger, our records are soaring higher, the pocketbook is fatter, meetings more interesting, our contest prizes are getting juicier, and the trophies—well, not to mention the point system, our collection of 'perpetual mugs' is gettin' greater all the time. Recent winners are:

"December, Outdoor, 3-flight total. Low-Wing: Bob Garnett, 185.5; Phil D'Ostillio, 175.5; Ed. Haraske, 148.1. H. L. Glider: Carl Hermes, 85.5; Phil D'Ostillio, 78.8; Bill Young, 70.6.

"January Outdoor Meet: 3-flight average—Low-Wing: Bob Garnett, 1:09; Bob Porter, :48; Phil D'Ostillio, :41; Ed. Whitten, :33. Wakefield: Frank Nothnagle, 1:24; Bud Miller, 1:16; Phil D'Ostillio, 1:05; Bill Wargo, 1:01; Chet Kowalkowski, :48.

"The 1941 Point System incorporates several changes. Contests: A. One point for entering a club contest. B. 5 pts. for a 1st, 4 for 2nd, 3 for 3rd, 2 for 4th, 1 for 5th. C. 5, 4, 3, 2, 1 ratio for placing in outside meets (no point for entering). Meetings: A. 1 pt. for attending a scheduled meeting. Records: A. 1 pt. for establishing a club record, or for breaking a record by 2%. Disqualifications: A. Points and membership are lost after non-payment of dues amounting to a four week period.

West Virginia

John S. Harrington of 111 Key Avenue, Elm Grove, secretary of the Ohio Valley Jr. Chapter, says:

"The Model Airplane Club of Triadelphia High School sponsored a RECORD TRIALS meet in the Elm Grove Junior High Gymnasium on February 22, from 1 till 4:30 in the afternoon. I. L. Schneider, Wheeling A. M. A. Contest Director, acted as chief timer, while Oral Wells, faculty advisor for the club, recorded the times. The official results were as follows:

Stick Event:

George Friebertshauser	3:27.2 Cl. C
John S. Harrington	1:53.5 Cl. B
Bob Niebur	1:22.6 Cl. A
Jack Schneider	0:51.3 Cl. A
George Friebertshauser	0:27.8 Cl. A
Dale Richmond	0:23.1 Cl. A
Paul Soltesz	0:17.4 Cl. A
Nello Antonucci	0:09.8 Cl. A
Ben Schneider	No Official Flight Cl. A

Glider Event:

John S. Harrington	0:13.2 Class A
John S. Harrington	0:11.3 Class B
Paul Soltesz	0:07.2 Class A
Walter Fortuna	0:03.3 Class A

New York

Sno-Bird Gas Meet

Carroll Moon has been kind enough to send us a report of a recent contest:

The Sno-Bird gas model meet, conducted by the Sky-Scrapers Club of Brooklyn, on March 2, resulted in some 75 entries from throughout the East, despite a 25 mph wind. Winners were:

	Cls.	Av.	Best Flt.
Jerry Brofman, Brooklyn	C	3:02	6:35

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Cliff Travis, Yonkers	B	2:02.2	4:22
John Kebba, Queens	A	1:52	2:15
Eugene Bischoff, New York	C	1:43.2	2:15
Chester Kalin, New York	B	1:42.1	2:00
Irwin Bartos, Brooklyn	C	1:34	2:10
John Arribi, New York	C	1:27.2	1:48
Andy Strevast, Bloomfield	C	1:23.1	1:38
Dudley Kelly, Yonkers	A	1:19.2	1:55
H. Bartos, Borough Pk	C	1:17.2	1:51

Kebba used a Pacer, Bartos a Hornet, both designed by Sal Taibi (who was chief timer). Plans for both were published in MODEL AIRPLANE NEWS.

Coming Events

August 3—Noblesville, Ind.—Second annual model airplane contest sponsored by the "Model Maniacs." Classes A, B, C; A.M.A. rules. $125 worth of prizes. Entry fee is 50c in advance, $1 on day of meet; 25c for rubber event. Full details obtainable from Russel K. Lawson, 607 W. Plum Street, Noblesville.

June 8—Albany, N.Y.—Fifth annual State Exchange Model Airplane Meet, held in conjunction with the State Convention of Exchange Clubs. A.M.A. Sanctioned. Events are: Hand-Launched Stick, Fuselage ROG and Classes A, B, C in gas. Trophies, medals and merchandise to be awarded. Entry blanks obtainable from Harry C. Copeland, 712 Loew Building, Syracuse, N.Y.

May 18th—Anderson, Ind.—Third annual contest sponsored by the "Anderson Johnies." $57 in cash plus merchandise prizes. A.M.A. sanctioned. Events will be Gas, Fuselage Rubber and Stick Rubber. Entry fees: gas, 50c in advance, $1 at contest; rubber, 35c advance, 50c at contest. Mail entries to Bob Williamson, 315 W. 6th St., Anderson. They must be postmarked not later than May 15th to be accepted as advanced.

April 27—San Diego, Cal.—Sixth annual Official Southwestern State Championship Gas Model Airplane Contest. Sponsored by Exchange Clubs of San Diego County. Event will be at the San Diego Aeroneers Field, 6 miles north of Old Town on Escondido Highway. Awards include $125 in cash plus many trophies, ribbons and merchandise. Entry fee is 50c if sent in by April 20th, after that it's $1. Entry blank obtained from Franz Secrest, 816 Tangier Court, Mission Beach.

June 29—Newport, R.I.—A.M.A. sanctioned meet for gas and rubber powered models; sponsored by the Newport Stardusters Model Airplane Club. Though this is the only club in Newport, recently organized with ten members, it is growing steadily and quickly. Apply to Ellen O. Lynch, secy., 12 Blackwell Place, Newport, for full details.

June 15—Marshalltown, Iowa—Sixth annual Tallcorn State Model Airplane meet, sponsored by the Marshalltown Junior Chamber of Commerce. Events to include Classes A, B, C in gas and Class D Outdoor Fuselage in rubber. There is a small entry fee. Write Wallace R. Blake, Director, care Model Airplane Meet, 18 North 1st Street, Marshalltown, for entry blank.

May 25—Fresno, Cal.—A.M.A. sanctioned gas model contest. Large cash plus many valuable merchandise awards. For details write Irwin G. Ohlsson, 3340 Emery St., Los Angeles.

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Books

A helpful book just released for sale is "Careers in Model Aviation—How to Make Your Hobby Pay You," published by Winston Publishers, 1500 E. 48th St., Brooklyn, N.Y. It has 100 pages, containing interesting data for model builders.

Flash News

(Continued from page 29)

Sight and special high altitude and cold-weather equipment which was being tested preparatory to an Alaskan non-stop test flight. Lieut. John H. Eakin and Lieut. Joseph Laycock both lost their lives when their speedy Curtiss P-40 pursuit planes locked wings during formation flying near Mitchel Field, New York.

Lieut. J. E. Kinsey lost his life when his Curtiss P-36 pursuit plunged into Panama Bay near Balboa, Canal Zone. Lieut. W. S. Rutherford and Lieut. G. B. MacDonald lost their lives in the crash of a Vultee BT-13 training plane near Moffett Field, California. A giant Douglas B-18 twin-engine bomber crashed and burned in Panama Bay and a search failed to disclose a trace of the seven-man crew. Names of the men are not yet available.

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HAND TURNED STEEL PROP SHAFTS, Small 1c; med. 2c; large 2c.

Free Wheeling Prop. Shafts—.040"—9c; .049"—12c; 1/16"—15c. Soldered. Complete with coil spring, etc.

Collapsible Bobbin put on after shaft is bent to exact shape—adjustable. Beats old type, saves rubber—10c.

Propeller Hinges state shaft diameter, width of hub, length between hinging points. Designed to rest blades snugly to fuselage. Pop. sizes ⅜" x 2", ½" x 1¼", ⅝" x 1½", or any size. Single 15c. Double 20c.

Rubber Tensioner and Prop. Shaft .040—10c; .049—15c; 1/16"—20c. Full Instructions.

Semi-Cut Prop. Blocks designed to give maximum thrust of rubber—1c per inch plus 5c.

Dowel Type Rear Hook Sets—⅛", 3/16", ¼"—5c per set.

Rubber Lube—New formula—Heat and light resistant. 15c per oz. Coil springs .014-.020 .04c ea.

New Ball Bearing Washer—small 8c; 1/16"—10c.

FREE Ball Bearing Washer with each hinge and tensioner combination or retractable gear.

Packing cost on all orders 10c; U.S. Possessions add 15% of order to packing cost. No Stamps.

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Van Sinderen Ave. Brooklyn, N. Y.

Another B-18 bomber was forced down in a desolate spot on Hawaii Island. The ship, with its six-man crew, was on a routine training flight from Hickan Field.

A six-foot wind-tunnel test model, valued at ten thousand dollars, was stolen from the office of the Manta Aircraft Corporation, David R. Davis, designer of the famed Davis Wing with which the ship was equipped, announced. A model of the super-speed fighting plane he has designed for the U. S. Army Air Corps, the ship includes the very latest advances in pursuit ship design. Another two-foot model, valued at five hundred dollars, was also stolen. Officers of the Federal Bureau of Investigation and the Army Intelligence Service are investigating.

There are now more than 4,000 planes of all types in service with the U. S. Army Air Corps, states Secretary of War Stimson. Half of these are bombers, fighters and combat ships, the remaining training planes.

A Douglas B-18A bomber has been equipped as a "flying dark-room" at March Field, California. Through the installation of special high-speed developing and printing equipment, the giant bomber can photograph enemy positions, develop and print on the way to its base and drop the completed pictures before returning for another session. Now at March Field are 15 Royal Air Force officers undergoing flight training on the huge four-motored Boeing B-17B's preparatory to the ferrying of Boeing and Consolidated four-motored heavy bomber from Botwood, Newfoundland, to Heston, England.

The War Department has awarded twenty million dollars for the erection and equipping of new factories to be engaged in aircraft defense manufacture. The Thompson Aircraft Products Company of Cleveland has received a contract for $11,198,472 to purchase land, erect a building and install machinery to manufacture parts for airplanes and engines. The Sperry Gyroscope Company of Brooklyn has received an award of $3,025,000 for machinery and equipment to manufacture bomb sights, aircraft instruments and technical equipment for U. S. Army Air Corps combat planes. The Murray Corporation, Detroit, has received $1,952,474 to erect a plant and install machinery to manufacture wing assemblies and spare parts for Douglas A-20A light attack bombers. The Hudson Motor Car Company will manufacture piston rods and crankshafts for Wright Cyclone motors in its new plant addition.

NAVAL AVIATION—Two Northrop BT-2 Naval dive bombers crashed into the sea off La Jolla, Naval practice dive-bombing range, taking the lives of four airmen. The ships locked wings while engaged in dive-bombing maneuvers from the Aircraft Carrier U.S.S. Enterprise, where they were attached to Bombing Squadron VB-6. Ensign G. S. Maxwell and E. W. Clary, second class seaman, were in the first ship, Ensign W. A. Daniel and E. S. Lemor, aviation machinist's mate, were in the second. A scout-bomber of the Vought SB2U-1 type, attached to the Lexington carrier, crashed into the sea but both members of the crew were saved.

Fortification of Guam debate loomed again in the House as President Roosevelt asked for $4,700,000 for establishment of a naval air base and plane facilities on the western-most U. S. possession.

Flight test of the navy's newest and biggest ship, the first production model of the giant Consolidated PB2Y-2, four-motored patrol-bomber were under way at San Diego when the navy accepted delivery of the first of 13 of the monsters and stationed it with the 13th Patrol Squadron at North Island Naval Air Station. Considerably revamped over the prototype XPB2Y-1, this new version has redesigned nose and tail gun turrets and the addition of a huge streamlined glass-enclosed aerial cannon implacement on top the hull.

THE INDUSTRY — Present back-log of military aviation contracts of the leading companies:

Boeing Aircraft Company, Seattle, Wash.	$206,000,000
Consolidated Aircraft Corp., San Diego, Calif.	320,000,000
Douglas Aircraft Company, Santa Monica, Calif.	340,000,000
Lockheed Aircraft Corp., Burbank, Calif.	277,000,000
North American Aviation, Inc., Inglewood, Calif.	205,000,000
Northrop Aircraft Corp., Hawthorne, Calif.	25,000,000
Ryan Aeronautical Corp., San Diego, Calif.	10,000,000
Vultee Aircraft Corp., Downey, Calif.	90,000,000
Curtiss Airplane Company, Buffalo, N. Y.	422,000,000
Grumman Aircraft Company, Bethpage, N. Y.	14,000,000
Brewster Aircraft Company, Newark, N. J.	48,000,000

Curtiss-Wright has announced plans for erection of the largest propeller plant in the United States. Employing 4,000 men, this new plant of the Curtiss Propeller Division is located near Beaverborough, Pennsylvania, and will manufacture its three- and four-bladed electrically-controlled models for the U. S. Army Air Corps, naval aviation and the Royal Air Force.

The Buick Division of General Motors has announced plans for immediate construction of a thirty-one million dollar aircraft engine plant in Melrose Park, near Chicago. When completed the new factory will be capable of producing 500 Pratt & Whitney Twin Wasp Senior air-cooled double-row radial engines per month.

Henry Ford has completed preliminary engineering work on his new 12-cylinder "V" liquid-cooled aircraft engine and production will begin upon completion of his new factory. The engine, developing 1,600 horsepower, will be equipped with fuel injectors, exhaust driven supercharger and ejector exhaust ports. Plans are well under way for the erection of his Douglas Bomber manufacturing plant. It will have a MILE-LONG final assembly line down which the planes will move on conveyor belts. Both airplane and engine factories will be bomb-proof, being provided with 22 inches thick concrete roofs.

tunnels and underground conduits. More than fifty million dollars will be spent on the two factories.

Aeronautical Corporation of America will soon change its name to Aeronca Aircraft Corporation.

The Cornelius-Hoepli Company has announced plans for erection of a factory and production of the famed Cornelius movable-wing airplane. The wing is so arranged as to have a nine degree movement of the angle of incidence or, in non-technical language, the angle of the wing chord line and the center line of the fuselage.

The ship is a four-place design powered with a Franklin, 130 horsepower engine. The wing is "V" shape with the nose of the fuselage in the open part of the "V". It has 206 square feet of wing area and will have a top speed of 168 mph.

The General Electric Corporation of Schenectady, New York, has received a contract from the War Department for $18,040,429 to manufacture gear and exhaust-driven superchargers.

The Pitcairn-Larsen Autogiro Company of Willowgrove, Pennsylvania, is starting construction on a number of military autogiros for the Royal Air Force. This will include erection of an 100,000 square feet factory and grading and surfacing of 267 acres of land at Pitcairn Field.

Colonel Muniz of the Brazilian Air Corps has been put in charge of licensing purchases from manufacturers here in North America. At present Brazil is building North American and Waco training and basic combat planes and negotiations are under way for licensing of other planes. This new, recently completed, plant is the first aircraft plant in Brazil to manufacture military airplanes, although a joint French-controlled plant was started several years ago.

Pan American Airways has announced it will use Boeing Stratoliner landplanes this summer on its trans-Atlantic routes.

There were 3,016 Piper Cubs manufactured last year! And the government complains about aircraft construction!

Henry Ford has a new riveting process which will speed the assembly of military planes immeasurably once it is introduced into the aviation industry.

The Latin-American Airport and Radio Construction Program has been outlined and twelve million dollars placed at its disposal by the War Department. Object is to survey, construct and operate new and vitally needed airports and radio beacons in South America. Caribbean Engineering Corporation will do the job with the aid of the War Department and the U.S. Corps of Engineers.

The Marrow Aircraft Company has been formed in San Bernadino and construction will begin immediately on a new plant to build a light, two-seat training plane.

The Naval Aircraft Factory has been turning out a plane-a-day since last July. The ships are all-metal biplane N3N-1 trainers.

"There is enough rubber on hand in the United States to last another year," declares Paul Litchfield, President of Goodyear, "after which we will be forced to use synthetic rubber. This process has been perfected and the United States will never feel a shortage of rubber for its defense needs."

Vega Aircraft, division of Lockheed, has moved into its new and spacious factory at Lockheed Air Terminal, recently purchased from United Aircraft at a cost of $1,500,000. Conveyor-belt assembly lines have been installed and production is now at the rate of four-a-day on the bigger and more powerful Lockheed "Ventura" bombers for the Fleet Air Arm and Coastal Command.

The Johnson-Funcke Aircraft Company is constructing a new plant at the Long Beach Airport for construction of a 3-5-place plane which will be powered by two-engines mounted on the wing in push-pull fashion.

Ryan Aeronautical Company, San Diego, has begun laying the foundation for a $350,000 expansion program involving addition of 100,000 square feet to the present 140,000 under use.

Northrop is well under way on a new 313,000 square foot addition which, when completed, will bring the total area of the Hawthorne plant to well over 500,000 square feet. This addition will make possible use of a 600 foot-long final assembly line with more than two dozen sub-assembly lines feeding it.

Fletcher Aviation Corporation of Burbank has begun production on its new FBT-2 basic trainer. The ship is constructed of plywood, powered with a 130

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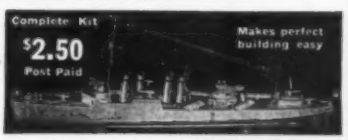

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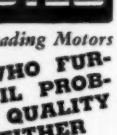

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Transcontinental and Western Air now has a fleet of 43 airplanes, 35 of which are Douglas DC-2 and DC-3's, 5 Boeing Stratoliners, a Lockheed for research and two Waco cabin planes. The company has an order for 15 Douglas DC-3 transport planes scheduled for delivery early this year.

Pan American Airways has a pilot training program which rivals even the United States Army and Navy courses for thoroughness and intensity. Apprentice pilots must undergo two years of rigid schooling and actual practice in all phases of operation before they may even become junior pilots. These are required to have a transport license, second-class radio operator's license, airplane and engine mechanics license and a total of at least 1200 hours of time.

With an enrollment of 2,044 students, about 500 of whom are air corps enlisted men, Curtiss-Wright Technical Institute is now the largest aviation technical school in the entire United States. Within recent months eight new buildings have been completed and the available facilities make possible the training of 5,000 men annually.

Averaging 270 miles per hour while cruising, the first of 26 new four-motored Consolidated Liberator heavy bombers ordered by the Royal Air Force, completed the first leg of its journey, flying non-stop to New York City from the San Diego plant.

There are 75,000 licensed pilots of all classes in the United States and at the present rate there will be 100,000 licensed flyers by the end of next June, according to officials of CAA's Civilian Pilot Training Program. There are 907 training centers of the CPTP giving the third and final course of instruction to 19,000 trainees. Some 15,000 are being initiated in preliminary courses and 40,000 more are enrolled in secondary classes.

To-day there are 5,195 NEW MEN going to work EVERY WEEK in the aviation industry: A year ago there were only 1,491 men, a terrific figure in itself. By the first of 1942 there will be 10,000 new men going to work every week in the accelerated national defense aviation rearmament!

INTERNATIONAL—Adolf Hitler has decorated Major Adolf Galland, 28-year-old fighting squadron leader with the oak leaf of the Iron Cross for his "40th individual victory of the war." His squadron (Messerschmitt Me 109's) has amassed a total of 385 Allied planes since May 10th.

First report of actual American plane participation in the war comes from Lord Beaverbrook, head of aircraft procurement, who states: "The Brewster Fighting Squadron is in use and is earning the praise of our finest pilots." These are the navy model F2A-1 single-seaters originally ordered by Belgium but re-contracted by the British. "The Douglas DB-7 is also in action and the new Curtiss P-40's have arrived. These three aircraft are equal to our best machines." Which is the British way of saying these Yank planes are slightly terrific!

Some dispelling of the mystery surrounding the Douglas DB-7 in France was assured with the recent report that the first 100 of these ships never reached French soil but are now aboard the French Aircraft Carrier Bearn bottled up by the British Navy at the Caribbean island of Martinique. Also aboard are a consignment of Martin 167's and several French Loire-et-Olivier torpedo planes. The British have blockaded this vessel to prevent its falling into Nazi hands.

First of the British "Flying Fortresses" has gone into action. This new mystery plane is the Short "Sterling" powered by four Bristol Hercules motors. The ship resembles the B-17 very closely, with a single rudder and mid-wing design.

Pilot Officer William Mead Lindsley Fiske and Pilot Officer Arthur (Texas Shorty) Donahue, the former of New York, the latter of Texas, have been killed while flying with the Royal Air Force, the first two Americans reported.

Model Designing Simplified

(Continued from page 11)

step, that of selecting the type. It is to be a fuselage model but there are many classifications of planes with a fuselage; for instance, it can be a tractor, monoplane, biplane, or triplane, or it can be a pusher. All of these types may have one or two propellers.

If we keep the purpose clearly in mind it will make our problem simple. Merely select the simplest and most efficient type of model. Complication is not to be tolerated; therefore, biplanes or triplanes with more than one propeller are eliminated. This establishes our ship as a single propeller monoplane. It is more difficult to build a pusher model with a fuselage than a tractor model, consequently, our plane should be of the tractor type as far as simplicity is concerned. Also, this type can be made as stable as any other and therefore fulfills our other consideration. The model type can be narrowed down still further. Monoplanes can be classified as low-wings, mid-wings, high-wings, or parasols. These are shown in diagram No. 1. Figure A shows a low-wing; B, a mid-wing; C, a high-wing; and D, a parasol monoplane.

One of the factors which contributes to stability to the greatest extent is the low center of weight, or commonly called center of gravity (c.g.). This is the point of balance of the airplane. In other words, if your plane is held at this point in any position it will remain motionless. When in flight the plane will react as if its total weight were located at this point. In the figures a dot indicates approximately where the center of gravity of each one of the types would be located.

The wing of an airplane is the part of the structure that lifts and supports the plane in flight. Center of lift, indicated by c.l. in the diagram, shows the point at which total lift of the wing would react if all small units of lift on the wing were concentrated. In Figure A you will see it below the center of gravity. In Figure D, parasol model plane, it is above the center of gravity. Consequently, in A a condition exists in which the plane is supported at c.l. and its weight is acting downward at c.g. This represents a condition similar to a tight-rope walker in which any deviation from normal position tends to increase the state of unbalance. In Figure D, center of lift is above the c.g. In other words, weight is hanging below the point of support, giving the effect of a pendulum. Any deviation from normal position in this case will tend to be corrected immediately by this pendulum effect. Consequently, the parasol plane is much more stable than a low-wing, or any of the intermediate types, and will be selected as the one to build.

Third, how large is the model to be? This is the next question and is determined by the wing span. A rubber powered model is considered to be small when it has a span of 12" or less; it is large when the span is 30" or more. Usually small models are inefficient and erratic in flight, being most difficult to fly. They also involve lighter and more delicate structures; difficult for the novice to build. The smaller a model, the more delicate the craftsman's touch must be. On the other hand, if a large model is constructed it will be more susceptible to damage when flown. Usually a happy medium is desirable. Models of 21" to 24" in span fly very well and are easy to handle; also they are small and light enough to be durable. Suppose, therefore, we select to build a model of 24" span.

We have now reached the fourth consideration—proportions of the model. Upon these the efficiency and stability of your craft will depend to a large extent; in fact, a model that is not proportioned properly will not fly at all. The reason for failure of most builders to design and fly successfull model planes is inability to proportion them properly. For instance, the plane's stability and efficiency depends largely upon size of the tail surfaces, size and pitch of the propeller, and distribution of weights and vertical areas. There are many things to consider but proceeding step by step will make the problem a simple one. A list of the factors involved in the proportions of a plane and their symbols, are as follows:

(1) Wing Span, (S)
(2) Wing Chord, (C).
(3) Tail Moment Arm, (M).
(4) Nose Length, (N).
(5) Propeller Diameter, (D).
(6) Propeller Pitch, (P).
(7) Propeller Blade Area, (a).
(8) Stabilizer Area, (A_s).
(9) Stabilizer Span, (S_s).
(10) Stabilizer Chord, (C_s).
(11) Fin Area, (A_F).
(12) Fin Height, (H_F).
(13) Vertical Disposition of the Fin.
(14) Distance of Wing above the Line of Thrust, (R).
(15) Distance of Lower Body Line below Line, (X) of Thrust.
(16) Location of Landing Gear.

If all of these can be given the correct values and put in their proper position relative to one another, the plane will be efficient and stable. There are certain

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definite rules of proportion for this type of model. The sizes of all aerodynamic factors are based on one fundamental measurement: the Wing Span. Therefore, we give the table which follows, listing the factors showing proportion of each one relative to others and its mathematical value calculated from these relationships:

PART	RULE OF PROPORTION	VALUE
1) Wing Span	=	=24″
2) Wing Chord	=1/6 to 1/8 Wing Span	=3.5″
a) Area	=Span x Chord minus Trim	=80 sq. inches
b) Aspect Ratio	$=\frac{\text{Span}}{\text{Chord}}$	=6.8″
c) Wing Dihedral	=3/4″ per ft. of Span	=1-1/2″ rise (each tip)
3) Tail Moment Arm	=3 x Chord	=10.5″
4) Nose Length	=1/2 M (approx.)	=5.5″
5) Propeller Diameter	=1/3 to 1/2 Wing Span	=9″
6) Propeller Pitch	=1.6 x Diameter (Approx.)	=14″
7) Propeller Blade Area (approx.)	=15% of Wing Area	=12 sq. inches

It is important to know the pitch and blade area of your propeller. However, it is necessary to translate these values into the actual measurements of the block from which the propeller is to be cut. The size and proportion of the block must be such that pitch and blade area will be of correct value when the propeller is cut out. The problem is to translate diameter, pitch and blade-area into terms of blade length, depth and width. Then, when your propeller is carved by the diagonal method, to be described later, the propeller will have the desired diameter, pitch and area.

Diameter may be defined as the diameter of a circle described by the blade tips when rotating. For a two-blade propeller, diameter is the length of the propeller. Pitch is the distance travelled forward by the propeller as it screws itself through the air in one revolution. The blade area is the total area of one side of all the blades. If the builder wishes to determine the actual value of this quantity, he may do so by means of the following formula:

$$a=\frac{(\sqrt{w^2\times d^2})+d}{2}\ (0.4D)$$

w = width of propeller block from which it is cut.
d = depth of block.
D = propeller diameter.

If the propeller has two blades, the answer should be multiplied by two in order to determine the total blade area. If three blades, by three. Consequently, the values of block depth and width must be determined; they are as follows:

PART	RULE OF PROPORTION	VALUE
a) Block Depth	=1/4 x Wing Chord (cw)	=0.875=(7/8″)
b) Block Width	=2d	=1.75=(1-3/4″)
8) Stabilizer Area	=1/3 x Wing Area	=27 sq. inches (when trimmed)
9) Stabilizer Span	=4/10 x Wing Span	=10″
10) Stabilizer Chord	=3/10 x Stabilizer Span	=3″
11) Fin Area	$=0.11\times\frac{\text{Span (wing)}}{2M}$	=12.57 sq. inches
12) Fin Height	=1.4 x Fin Width	=(To be calculated)

Inasmuch as fins are of irregular shape, definite values for height and width must be determined experimentally but it should be shaped so as to have proportional values as given above.

13) Fin to extend 75% above Thrust Line, 25% below Thrust Line.

14) Distance—Thrust Line to Wing Chord	=1/7M	=1.5=(1-1/2″)
15) Distance—Thrust Line to Lower Body Line	=1/6M	=1.75=(1-3/4″)

16) Bottom of Wheels (Ground Line) should be 1/8 of propeller diameter below the tip circle of propeller, or below the lower blade tip when propeller is in vertical position. This will give a value of 1-1/8″; therefore the Ground Line should be 5-5/8″ below the Thrust Line.

a) Distance—Thrust Line to Ground Line	$=\frac{5D}{8}$	=5-5/8″
b) Distance—of Axle forward of Vertical Line through Center of Wing	{2/3 x distance—Thrust Line to Ground Line}	=3.75=(3-3/4″)

Now all the necessary proportions of the plane have been established and you are ready to lay out these proportions on your drawing board as the basis for plans of your airplane. These are called lay-out drawings. You are actually designing the plane when you perform the operation of putting these on paper. When they are completed the next step will be to put in details of the structure; and then make final drawings from which to build your plane, by tracing the complete detailed layout.

These succeeding steps will be taken up in our next article. Until then—HAPPY LANDINGS.

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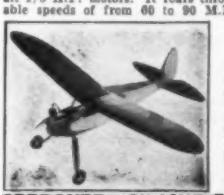

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*AFTER MORE THAN ONE FULL YEAR—
Planning • Designing • Testing and Perfecting
COMET TAKES PRIDE IN *Announcing*

A *Matched Unit* WHICH IS DESIGNED TO CREATE NEW STANDARDS OF *Gas Model* PERFORMANCE!

COMET "35" PROPELLER

The COMET ZIPPER

COMET "35" MOTOR

The COMET "AIRSPEED 35" PROPELLER is a worthy companion to the Comet Zipper and the Comet "35" Motor. Carl Goldberg calls it "the highest thrust prop manufactured for gas models!" It took months of experiment and thousands of tests to develop the COMET "AIRSPEED"; it was carefully designed by Carl Goldberg himself for utmost efficiency; tested scientifically for maximum thrust, precision manufactured on exclusive special automatic equipment, and super-finished to smooth perfection!

Comet Airspeed 35—hand-rubbed and polished to a high gloss, 35c. Airspeed 25—carefully finished and lacquered, 25c. Airspeed 15—partly finished, unlacquered, 15c. All props 8" to 14". Postage on any prop, 10c; none if ordered from dealer.

Already famous as the most popular and imitated gas model in history, the COMET ZIPPER is destined to reach new heights of breath-taking performance with the Comet "35" Motor and "Airspeed" Propeller! The amazing climb, superb glide and exceptional stability of the ZIPPER have kept it on top. Designed by Carl Goldberg, it has such outstanding features as the Detachable Motor and Ignition Unit, "Automatic Pilot" Wing Mount, Double Elliptical Wing, and many others! The Comet "35" Motor and Airspeed Propeller get more out of the ZIPPER than was ever before possible, because they were specifically designed to take advantage of every engineering and aerodynamic principle.

Kit No. T10—wing span 54"..... $3.95
Postage 25c; none if ordered from dealer.

The COMET "35" MOTOR wasn't released to the model builders of America until it had definitely shown itself to be up to Comet's high standards. Inspired design has endowed it with superb performance characteristics; and rigid quality specifications have given it long, trouble-free life. Its features include one-piece steel crankshaft, hardened and ground; large bearings to assure no loss of compression; foolproof timer, fully enclosed; tungsten points; cast-iron piston, micro-lapped into special steel cylinder. Carl Goldberg states that the COMET "35" has by far the most power for size of any Class "C" Motor on the market—and he personally conducted complete and exhaustive thrust tests which furnish the basis for that statement!

Comet "35" Motor, complete with Smith coil, metal-clad condenser, de-luxe run-in block and Motor Manual, $12.95. Fully guaranteed in working. Postage 50c; none if ordered from your Comet dealer.

SEND 5c IN STAMPS FOR BIG, NEW, COMPLETE COMET CATALOG: lists gas models, flying models, boats, R. R. cars

COMET MODEL AIRPLANE & SUPPLY CO.

129 West 29th Street, CHICAGO, ILL. Dept. MN-5 688 Broadway, New York

PACIFIC COAST DISTRIBUTORS: Comet-Western Model Airplane Co., 4516 Hollywood Blvd., Los Angeles, Cal.; Douglas Company, 185-189 East 2nd South St., Salt Lake City, Utah, Exclusive Utah Distributor; Exclusive Distributor, New York City

COMET MAKES MOTOR HISTORY

The COMET "35"

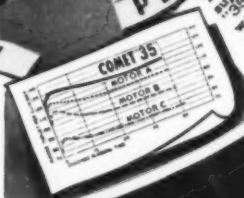
NO OTHER MOTOR IN CLASS "C" HAS SO MUCH POWER FOR THE SIZE

POWER

Amazingly high ratio of power-to-size! Although displacement is only .35 cu. in. the COMET "35" pulls 45 oz. thrust, develops 6500-7600 r.p.m. with a 13" prop., by actual laboratory test!

PERFORMANCE

The power-for-displacement superiority of the COMET "35" is not guess work—it was definitely proven in tests conducted against the 3 most powerful Class "C" motors on the market. The chart tells the story!



DURABILITY

6 year accelerated service test, equivalent to 6 years of running on field, developed no appreciable signs of wear in a COMET "35" taken from stock. Built to endure, every part designed for long, trouble-free service!

$12.95

Complete with Smith coil metal-clad condenser, deluxe run-in block and Motor Manual. Full written guarantee. Postage 50c; none if ordered from dealer.

A STATEMENT *by* CARL GOLDBERG

"Thrust tests I have run indicate that the COMET "35" has by far the most power for the size of any Class "C" motor on the market. Endurance tests covering the equivalent of 6 years of normal use reveal no appreciable wear on vital parts." *Carl Goldberg*

EVERYTHING THE GAS MODEL BUILDER NEEDS

When Megow came into the field, model airplane building was dependent entirely upon the ingenuity of the individual builder. Since that time, Megow has become a world-wide industry, so that scale and outline models of all kinds and sizes are available, and models of sensational new fighters and commercial planes follow closely upon the production of their prototypes.

Engines, sponge rubber wheels, propellers of all sizes, color-coded balsa wood, supplies and special tools have been made available through Megow dealers all over the country and in foreign lands, and for those not conveniently near a dealer, the Megow Catalog answers every need.

MODEL SHIPS. *The Megow Catalog contains scores of model ships, carved hulls and ready-made parts—everything needed by the builder of model ships.*

MODEL RAILROADS. *O and HO gauge locomotives, passenger and freight car kits, control equipment, rubber roadbed, track equipment, buildings and trackside equipment designed to scale.*

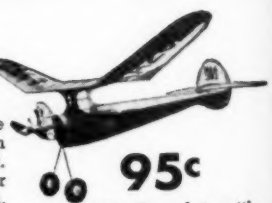
Send 10c for big, 132-page Catalog of Airplanes, Ships, Railroads, Parts and Supplies!

Ranger $1.50

Holding National "Open" Record

Primarily a Class B, the RANGER is a Class A when used with the Megow 199 Motor shown here. Span 46". Wing area, 325 sq. in. Weight, ready to fly, 18½ oz. Complete with motor, wheels, propeller, flight timer and kit, **$15.75.** Kit only, **$1.50.** Motor only, **$12.50.**

AeroChamp 95c



New type designed to take the 199 motor shown above. Easy to build. Small, light and sturdy for safe landings. Span 46 in. Kit E-21, less wheels and propeller, **95c.** Complete with motor, wheels, prop., kit and flight timer, **$14.95.**

SOARING Eagle $2.95

3-unit construction, easy to build, transport and fly. Marvelous in performance. Climbs at steep angle, flies without hanging on propeller. Low-mounted wing—no tendency to loop. Class A. 46" span, for any "A" motor. Fin. prop. **$2.95.** Class B. 54" span, for any "B" motor. Fin. prop. **$3.95.** Class C. 6 ft. span for any 1/5 h.p. motor. Fin. prop. and puncture-proof wheels, **$4.95.**

MEGOW Streamlined Sponge Rubber WHEELS

Puncture-Proof. Very resilient.

2½ in. per pair, **45c.** . . . 3½ in. **55c**

X-ACTO Refill-Blade KNIVES—Interchangeable blades. Many types available.
No. 1. Small knife, 1 blade, **50c**
No. 2. Large knife, 1 blade, **50c**
5 extra blades, assorted or one style, **50c**

ALL-METAL BATTERY HOLDERS—
For Penlites, **40c.** For Medium Size Cells, **40c**
For Standard Size Flashlight Cells . . . **50c**

NEW Y-TYPE EXHAUST . . . **$1.50**
Fits almost any ⅜" motor.

"DG" PROPELLERS
9" to 14", **15c** ea.

"WIZ" PROPELLERS
8" to 14", **25c** ea.

BUILDING MEGOW PIPER CUB GAS MODEL

A beautiful model. Easy to build with Megow's ready-carved Leading Edge. Span 52¾". For any ⅓" motor, **$3.95.**

Megow

Philadelphia, Pennsylvania